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Hydraulic Mining in California.*

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Dam.—The place to tap the supplying stream and to build the "head dam," deserves careful consideration. The streams of California are subject to rapid rise, and change their volumes of water constantly, so that at one time all the water in the stream may be needed to supply a ditch, where at another time fifty or a hundred ditches could be made to overflow. Under these circumstances strong dams are needed. The best place to build such a dam will be a narrow place on the river, protected on both sides by projecting ledges of rock. All the mountain streams of California afford many such places. The building of the dam will be done, of course, when the water is at its lowest. The strongest dams are constructed by throwing the trunks of pine trees from shore to shore across the river, putting the first layer, or foundation, from 6 to 8 feet apart, for a width of 40 or 50 feet, then placing another layer of pine trees at right angles and at the same distance across the first layer, and alternating in this way till the dam has reached the proper height. Where the trees cross each other notches ought to be cut and iron spikes driven in, to make the structure perfectly solid. The trees which are to lie lengthwise in the stream ought to be thrown in with part of their top branches on, and turned up stream. The sand, &c., carried down by any future flood will cover these branches, and make the destruction of the dam impossible. After the structure is built, the open places ought to be filled up with stones, earth, gravel, sand, pine branches, &c., and in a short time the dam will be tight and safe against all chances.

On one or the other side of the dam a gate for the ditch must be constructed. This gate should be, if possible, in the solid bed-rock, so as not to be affected by any succeeding flood. If a ledge of rock abuts enough to admit of the construction of a short tunnel, as the connection between the head dam and the ditch, such a chance ought not to be neglected. An iron or strong wooden gate, being controlled by lever or screw, to open or close the mouth of the tunnel, for the admission or cutting off of the water, would defy any flood.

Lumber.—After a careful survey is made, the best route for the ditch established, and the place for the head dam chosen, the work of digging the ditch may commence on the whole line. Should much fluming be necessary, and a great quantity of lumber have to be used for such purpose, the easy and cheap supply of the lumber deserves great consideration.

The mountain slopes which flank the streams of California afford an inexhaustible supply of pine timber, particularly in those places which, remote from any market, have escaped the ax of the lumberman. The head of a ditch being almost always located in such a region, is, therefore, usually surrounded by a forest of the finest timber.

A portable saw-mill could be established at any convenient point and would furnish all the necessary lumber. The ditch, though commenced along the whole line, must be rapidly finished from the head-dam downward, so that it can serve for the conveyance of sawed lumber where such is needed for fluming, &c. This mode of transport reduces the price of lumber by more than 50 per cent., since the freight amounts generally to more than that proportion of the price.

Excavation.—In digging the ditch along the mountain-slopes, the safety of the ground as to slides must be well examined, and the real body of the ditch must be always dug in solid soil, and far enough in the side of the mountain to leave at the outside or lower bank a level surface on which to place a part of the soil of the bank and the ditch.

The bank on the mountain-side must be carried on a good slope at once, so as to prevent slides from it, which, during the rainy season, would otherwise occur, not only filling the ditch, but causing great and dangerous breaks, since the water, checked in its course, would run over the lower bank, causing damages which would take much time and money to mend.

No operation connected with hydraulic mining needs greater care and foresight than the building of a ditch. The best constructed ditch will cause a great deal of trouble for the first year or two, but an indifferently constructed ditch will cause not only as much repairing as the first costs amount to, but be forever after only a second-hand affair.

Deep ditches are preferable to shallow ones, as the evaporation during the summer heat is far less in the former than in the latter. Still, before deciding on the depth of a ditch—whether 2 feet or 3 feet deep—it will be well to examine the soil through which it has to be dug. If the country bed-rock is covered only with a little soil, and if a ditch 2 feet deep would avoid the bed-rock, economy dictates the 2-foot ditch made wider.

All ravines or small water-courses crossed by the line of ditch must be secured in such a way that their water can either be admitted into the ditch or carried over it, as it is wanted or not. Regard must be had in this respect for the increasing volumes of water during the rainy season. It is a notorious fact that the quantity of water carried by established ditches during the summer season is reduced by nearly one third in its volume by the time the point is reached where the water is to be used. It may be true that in many cases the low state of the river from which the water is drawn is partly the cause of this reduction in volume; but in other cases, where the river affords an unlimited amount, the diminution of the water must be ascribed altogether to evaporation and leakage

The question arises whether it would not be advisable to counteract this lessening of the water by building the ditches wider at their head and reducing their width for a distance of a few miles till the normal size is reached. In the winter season, only a quantity answering the size of the lower part of the ditch would be admitted at the head. In summer, all the water the upper part of the ditch could carry would be admitted and brought along, even filling the ditch to the top of the lower (artificial) bank—which would be safe enough in summer. This plan seems well calculated to practically increase the capacity of ditches.

Trees.—Trees found on the line of the ditch, the removal of which is necessary, must never be cut down so that only the stumps remain. To grub up these stumps is a most difficult, tedious, and expensive work, and can be avoided by undermining the tree on the lower side, cutting its supporting roots and felling it down the hill, tree, stumps, roots, and all.

Flumes.—The flumes on the line of the ditch may be built either on a little less grade, or a little smaller, than the ditch, as the smoothness of the boards causes less friction than a rough ditch, and the water, therefore, runs faster.

Flumes are generally built of 1½ inch plank, with a framing of 4 by 4 and 3 by 4 scantling for every 2½ or 3 feet. The strength of the scaffolding for the flumes must be conditioned by their height, and left to the discretion of the builder. The foundation of this scaffolding ought to be on very solid ground, and, if possible, little exposed to water in puddles, coming and going as the season changes. Moreover, the bottom part of the supporting-posts, or the sleepers, ought to be well charred, as mentioned before, to prevent rot and subsequent settling of the flume. High flumes ought to be well anchored with strong wire, or wire rope, to protect them against winds.

Where a flume is to be built, the underbrush, fallen trees, &c., ought to be cleared away—by ax, or fire, or both—to protect the flume against the conflagrations which occur in our forests from time to time during the dry season.

Flumes of sheet-iron are highly recommended. The iron could be protected against corrosion by immersion in Dr. Angus Smith's preparation of coal-tar, and would certainly afford a very durable and incombustible material. When the present high price of iron shall have fallen to near its former rate, this material will undoubtedly be used with great advantage.

The building of flumes should be avoided as far as possible, since, under the most favorable conditions, using the best kind of sugar-pine lumber, a flume will only last from ten to twelve years; and the cost of its repair is computed to be 75 per cent. higher than that of a ditch.

A flume carrying a constant stream of water is far less exposed to decay than one which carries water periodically. The alternate swelling and shrinking of the wood in the latter not only destroys the fiber of the wood, but also draws the nails, and thus injures the structure.*

IRON PIPES.

The use of iron pipes as aqueducts is not a novelty in California. As early as 1856 or '57 an iron pipe of 40 inches diameter was laid across a small depression

* By Mr. CHARLES WALDEYER, of Cherokee, Butte County, California, in Prof. RAYMOND's Report on the Mineral Resources West of the Rocky Mountains, 1873.

* Ditches for irrigation in England have been made of concrete, which is cheap and very durable. A long wooden box is made of the shape of the ditch, the concrete (composed of cement and gravel) is mixed and laid down, and the sides are built up of cement, outside the box, which is drawn along as the work proceeds. Cement is made by burning together chalk and clay, having in it a small proportion of sand. Very durable ditches are also made of sand and asphalt in this way.

at Timbuctoo, near Smartsville, Yuba County. The city of San Francisco is supplied by the Spring Valley Water Company, which has seventeen miles of 30-inch iron pipe, conducting the water across depressions of from 200 to 250 feet vertical depth.

During the summer and fall of 1870, the most important enterprise of this kind was carried out by the Spring Valley Canal and Mining Company, of Cherokee, Butte County.

Under the direction of JOSEPH MOORE, Esq., superintendent of the Risdon Iron and Boiler Works in San Francisco, an iron pipe 30 inches in diameter and 14,000 feet long was manufactured and laid across a depression of nearly a thousand vertical feet, formed by the gorge through which the West Branch of the North Fork of Feather River flows. This enterprise was a complete success, and found as such a deserved publicity, which makes its particular description at this place unnecessary. For the sake of handy reference, however, it may here be said that the pipe is made of the best sheet-iron, as follows: No. 14 iron was used for 150 feet pressure; No. 12 iron was used for 275 feet pressure; No. 10 iron was used for 350 feet pressure; No. 7 iron was used for 425 feet pressure; ¼ iron was used for 600 feet pressure; 5-16 iron was used for 850 feet pressure; ⅜ iron was used for 900 feet pressure.

A cistern with sand-box, which serves as receptacle for sand and gravel carried from the ditch, is constructed at the receiving point. An elbow of the pipe dips here in the water, to prevent, as much as possible, the entrance of air. A stand-pipe is adjusted 50 feet from the inlet, to permit the ready flow of water and the escape of air which may have entered the pipe. The pipe is laid in pieces 23 feet in length, riveted together, and in a trench 5 feet deep, and covered with soil to save it from thermal influences, causing expansion and contraction. The rivets used were for No. 14 iron. ¼ wire; for No. 12, ¼; for No. 11, three-sixteenths; for No. 9, ⅜; for No. 7, ⅜. A steam-riveting machine was employed. Air-valves, with floats, are used at different places, not only to allow the escape of air, when the pipe is filled, but also to prevent a collapse from atmospheric pressure, in case a vacuum should be created by some foreign matter (for instance, a plug of dry leaves accumulated in the ditch) stopping suddenly the supply of water.

In such constructions, the entrance of any floating matter should be prevented by a screen of strong wire, or iron bars, placed at some distance from the mouth of the pipe. Particularly in the autumn, when the leaves fall, care should be taken to remove the latter, whenever a quantity is collected before the screen.

The standing air-pipe mentioned above has not proved sufficient for the escape of all the air which is carried down by the water. The consequence is that, from time to time, the accumulated air makes an attempt to free itself, and, in doing so, rushes up the stand-pipe with great force, throwing out a large quantity of water, and even emptying the cistern.

The writer thinks a very simple arrangement would secure the undisturbed flow of water, and permit the air to escape as it accumulates, without interfering with the water rushing into the pipe. The water will form a solid body in that part of the pipe, which is filled from the lowest depression of the inverted siphon to an equal height, or level, in each arm of the pipe.

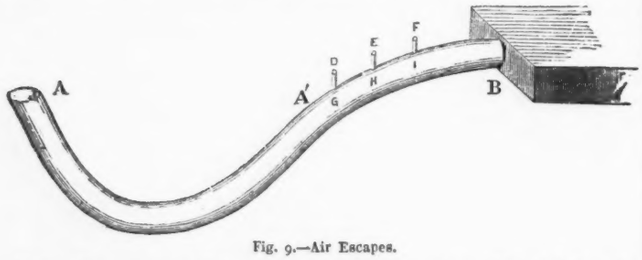

Fig. 9.—Air Escapes.

In the diagram given (figure 9) the undisturbed water would rest below the points A A^1, and only from A' to B could air interfere with the free admission of water. According to the greater or less supply of it, the water would rise or fall between A' and B; and the stand-pipes, represented by D E F, would not only become valueless, whenever the water should rise to the point of their connection with the main pipe, but would, under circumstances, discharge great quantities of water, whenever the latter should have risen in the main pipe above their height. Furthermore, there would be no continuous discharge of air, as the resistance of the flowing water against the escape of air would be comparatively as great between points G H or H I, as between A^1 and B. An arrangement is therefore needed, which will not only permit the air to escape at any point between A and B, but also prevent the rushing water from interfering with the free discharge of air.

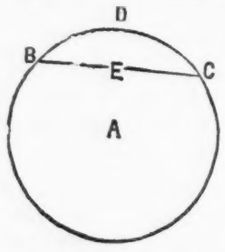

Fig. 10.—Air Escapes.

The writer proposes a simple plan, as illustrated by figure 10.

The circle A represents a pipe 30 inches in diameter, the line B C a piece of sheet-iron, 23 inches wide from B to C, and 5 inches below the point D. This piece of sheet-iron enters the pipe on a bevel, for a distance of 2½ or 3 feet, falling in this distance 1 inch. The sides B C are securely riveted to the pipe. A second piece of sheet-iron must be inserted in such a way that the first piece overlaps it for about 2 inches, leaving at the same time an open space of 1 inch in depth, and 24 inches in length between the two pieces of sheet-iron, where the overlapping takes place. Any number of additional pieces of sheet-iron are inserted in the same manner, forming, as it were, a shingle roof on the top of the pipe, with an open space of 1 inch in depth and 24 inches in length between each two shingles.

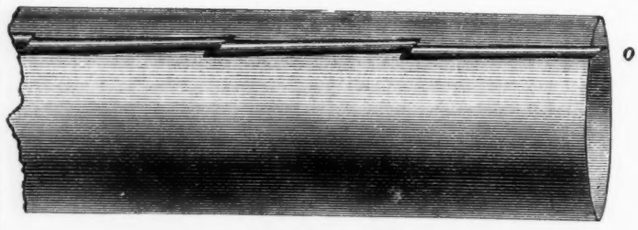

Fig. 11.—Pipe with interior "shingle roof."

The water enters at the point *o*, and is prevented from entering the air-chamber by the overlapping of the different iron shingles; the air, however, will, under the least pressure, escape through the open spaces between the iron shingles, and can be conducted to any final outlet, without interfering in the least with the rush of water.

This air-chamber needs only to be constructed in, and a little above, that part of the pipe which is subject to the rising and falling of the water, according to the greater or less supply. For instance, in a pipe like that of the Spring Valley

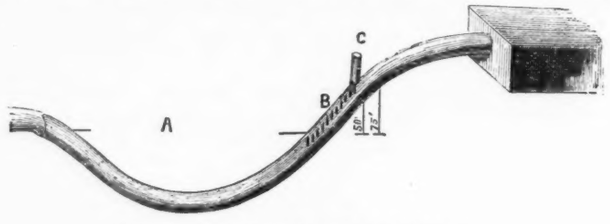

Fig. 12.—Pipe with "shingle roof" and air-chamber.

Canal and Mining Company, constructed for a head of 150 feet—when experience has shown that a hydrostatic pressure of never more than 50 feet is realized—the shingle roof, or air-chamber, needs only to be applied from near the "solid water" in the bottom of the pipe to a point giving a vertical height of 75 feet above the "solid water." Of this distance, only 50 feet or less would be filled with water, to form the head or hydrostatic pressure, and the remaining 25 feet

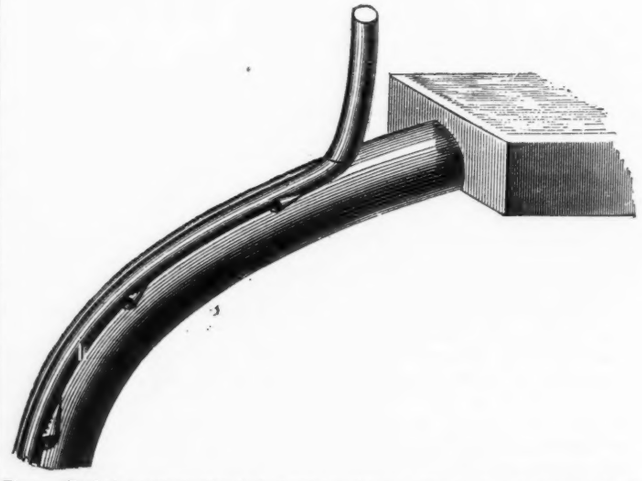

Fig. 13.—Feed-pipe with air-pipe for hydraulic machinery. The small or feed-pipe is inside the large pipe.

would secure a sufficient vent for all the air which possibly might come down with the rushing water.

It will be seen that the capacity of the pipe is not lessened by the introduction of the air-chamber; the latter consisting of nothing but pieces of sheet-iron riveted from side to side, and permitting the rising water to fill the air-chamber

from below, and thus to occupy the whole capacity of the pipe. The arrangement in itself is simple, and can be introduced into any pipe already in position, provided it is large enough to admit a workman.

For pipes conducting water to the hydraulic machines in the mines, the following plan is recommended to get rid of the air: A pipe of 4 or 5 inches diameter is perforated with holes, each, say, of 2 inches diameter, and at intervals of 2½ or 3 feet. These holes are covered with caps of the shape of half-funnels, and in such a way that the wider part of the funnel leaves an open space, lapping about 1 inch over the hole. The pipe thus prepared is inserted from 50 to 100 feet, according to the length of feeding-pipe, into the latter, the open funnel downward, and is secured firmly to the upper side of the feeding box. The upper end of this air-pipe must rise a few feet above the bulk-head from which the feeding pipe is supplied.

The air which necessarily enters the feeding-pipe with the rush of water will seek the easiest way of escape, and must, consequently, enter the inserted pipe through the open funnels. The caps over the holes of the air-pipes prevent the water, rushing down, from entering the air-pipe, and the air can be conducted safely to a final outlet.

The above arrangement would not lessen the capacity of the feed-pipe, as the water, rising in the latter, would enter the air-pipe through the funnels, and rise in both pipes simultaneously.

The advantage to be gained from this arrangement would be the almost total exclusion of air from the feed-pipe, and, therefore, the certainty of a solid and even discharge of the water from the hydraulic machine, securing the greatest efficiency and force of the water-jet.

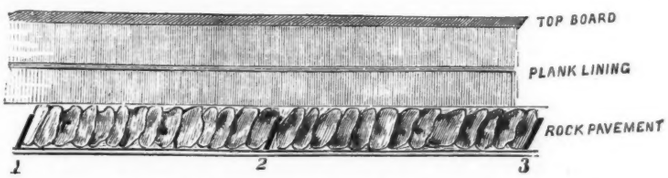

Fig. 14.—Sluice-boxes; grade 6 inches per 12 feet; sides 36 inches high; 1, 2, 3, compartments.

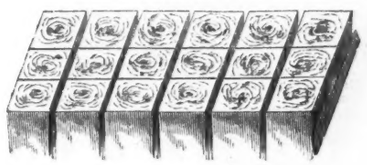

Fig. 15.—Block pavement for sluices.

MECHANICAL APPLIANCES.

Sluice boxes.—These are the highways upon which hydraulic mining is carried on, and their greater or less efficiency has an influence upon this business like that of the establishment of railroads or common wagon-roads upon general commerce.

Just as, by the cheapening of carriage, railroads open coal-fields, grain-producing regions, etc., to the markets of the world and to a brisk commerce, where common wagon-roads would hardly sustain a weak home-trade, so well-adapted sluice-boxes will render inferior gravel-deposits "paying institutions," while, *per contra*, rich gravel-deposits, without proper facilities for the placing of sluice-boxes, are worked at a loss.

The great requirement is sufficient grade, and a careful survey of the route should always be made before the sluices are put in place, so that the existing fall or grade can be husbanded to the best advantage for the establishment of under-currents, drops, grizzlies, etc.

Hydraulic mines are worked with as little grade as 3 inches, and with as high as 9 inches, per 12 feet. In the first case, abundant and cheap water generally makes up in some degree for the want of grade; in the second case a very high grade must make up for the limited supply of water.

Taking the above-cited cases as the extremes, we may say that 6 inches per 12 feet can safely be established as the normal grade, though many important and prosperous mines are worked with 4½ and 5 inches per 12 feet.

The establishment of under-currents and drops must be kept in mind when the grade for the sluice-boxes is laid out, and it is advisable to establish a number of under-currents on a long-line of sluice-boxes, even at the sacrifice of some grade. For instance, sluice-boxes, with 5 inches grade per 12 feet, and with a number of under-currents, are preferable to sluice-boxes of 6 inches grade and without the latter.

These facts must impress once more upon the mind of the miner the vital importance of sufficient fall for the working of a hydraulic mine, as such a favorable condition not only insures: 1, sluice-boxes over a high grade, and, therefore, able to carry immense quantities of gravel, etc.; 2, under-currents, or large, flat boxes, from 10 to 20 feet wide and from 30 to 50 feet long, provided through their whole extent with riffles, to catch gold or amalgam, (see description below;) 3, a grizzly, or an iron grating, placed in such a position as to throw down an embankment or precipice large rocks which have been carried in the sluice-boxes, and permit the smaller rocks and gravel to fall through the grating into a continuation of sluice-boxes, (see description below;) but admits also any additional improvement, such as undoubtedly the future has in store for hydraulic mining.

The size of the sluice-boxes must necessarily depend on the work they will have to perform, and may vary from 4 feet in width to 6 feet.

Supposing that a tunnel has opened the mine for work, of dimensions large enough to admit of sluice-boxes 6 feet in width, and from 36 inches to 40 inches high, a grade or route will have to be prepared outside of the tunnel to receive two lines of sluice-boxes of the same width and height. Both these lines of sluice-boxes must be connected with the boxes placed in the tunnel, and provided with strong gates, so as to cut off this connection at will. This arrangement permits the use of the sluice-boxes outside of the tunnel alternately, and the "clean-up" of one line of the boxes without interruption of the work in the mine. However, when the boxes *in the tunnel* are cleaned up, the washing in the mine must stop till this is done and till the blocks or riffles are replaced. A day is generally sufficient for this work, since the tunnels, with a few exceptions, are short, compared with the outside lines of sluices, and since, moreover, the pavement, or riffles, in the tunnel-sluice consist of blocks or sets of scantlings, which are far more easily removed and replaced than the stone-pavement, which usually forms the bottom of the outside sluices.

After the grading is done, according to the fall at disposal, sills are laid across the track 4 feet apart. These sills ought to be 4 by 6 inches, and, for a double sluice, about 15 feet long, so as to project on each side of the flume or sluice, to receive posts and braces. The posts are made of 4 by 5 inch scantlings, and either 36 or 40 inches long, according to the height of the sides of the sluices. The braces are made of 1½ by 6 inch lumber, and the sides and bottom of the sluice of 1½ inch plank. A piece of board 8 inches wide, nailed from post to post flush with the inside of the sluice, not only gives strength to the whole structure, but may also serve as a gangway.

Whenever a curve occurs in the sluice, the larger bend, or outside, ought to be raised from ½ inch to 1 inch, according to the degree of the curve. This will check the force of the current toward the outside curve and distribute the flowing matter evenly over the whole bottom of the flume, preventing the wearing of a deeper channel in the pavement on the outside curve.

The pavement of the sluices should be made of hard, flat stone; schist-rock or mica slate is excellent for the purpose. These stones must be placed edgeways, with a gentle slant from their base down the stream, forming a uniform thickness of 10 or 12 inches.

This pavement should be built in separate compartments of 6 or 8 feet length, confined by pieces of strong plank or scantling fixed permanently across the bottom of the flume, to protect the pavement against a wholesale destruction in case the current of the stream should dislodge some stones in one or other of the compartments. For 12 feet of double sluice, equal to 144 square feet, about 9 tons of stone are required for paving.

The sluice-boxes should be lined above the stone pavement with 2-inch planks or 2-inch blocks, for a height of 10 or 12 inches, to protect the real sluice against the wear and tear of the swift gravel-stream.

The single sluice in the tunnel must be paved with square pine blocks, about 10 inches deep. These blocks are laid across the flume, close together, and a piece of plank 1½ by 6 inches is nailed to the lower part of the blocks with headless nails. These headless nails are not driven home, but project about an inch on the face side. A new tier of blocks is inserted and driven on the projecting nails till the blocks touch the intervening board or plank, and are therefore within 1½ inches of the first tier. Another piece of plank is put in position and the same process continued. The lining of the sluices is placed so low down that it touches the tops of the planks in the bottom, and keeps them in position. These spaces of 1½ inches in width separate the different layers of block, and form the real riffles to catch gold or amalgam. The lining in those sluices which have rock pavements is, in many instances, placed so low that the rock pavement covers about 2 inches of it. This is done to prevent the wear of the rock pavement leaving a part of the sides of the flume, or sluice, unprotected. This, however, may be an unnecessary precaution, as the lining of the flume wears out much faster than the rocks, and can, when it has to be renewed, always be placed close to the rock pavement.

The expense of constructing a double sluice of the above dimensions depends both on the cost of the material used and the difficulty of establishing the proper grade. In localities where lumber can be furnished for $20 per M, and where the grading can be done without blasting, double sluices have been laid and paved in the most substantial way for $2 per foot. A single sluice, 6 feet in width and 3 feet high, can be constructed, under similar favorable circumstances, for about $1.25 per foot.

TO BE CONTINUED.

Coke vs. Anthracite on the Lehigh.—The Alburtis furnaces are now using coke from Western Pennsylvania in place of anthracite coal. With anthracite coal the Alburtis furnace used to carry about 7 pounds of blast. The use of coke, however, rendered it necessary to reduce the blast pressure to 3½ pounds, at which figure the hands are kept exceedingly busy in doing the necessary "filling." If the blast were now to be kept up to 7 pounds, it would be impossible to supply the coke and ore fast enough, and besides, it would necessitate the making of casts every two hours. Coke makes a far intenser heat than anthracite coal; and though it contains more gas than the latter, it is not as strong. It is brought from beyond Pittsburgh and costs delivered about $6 75 per ton. If the experiment proves successful, other iron firms will doubtless follow suite, and the demand for furnace coal will thus be largely reduced.—*Allentown Democrat.*

THE ENGINEERING AND MINING JOURNAL.

NEW YORK, SATURDAY, APRIL 3, 1875.

RICHARD P. ROTHWELL, C. E., M. E., } Editors.
ROSSITER W. RAYMOND, Ph. D., }

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Rapid Transit and the American Society of Civil Engineers.

THE question of Rapid Transit continues to attract great attention and the importance of the full discussion of the subject by the Society of Civil Engineers is becoming now fully appreciated; it is, therefore, greatly to be desired that the members will endeavor to be present at the meeting on the 7th inst., when the subject will be brought up. The various plans submitted to the committee and the committee's report will, we understand, be roughly criticised at that meeting, and those interested either in the general subject or the special plans should be present.

While the Society of Civil Engineers hesitates to express an opinion on this very important professional question, the whole project of Rapid Transit may be defeated by interested parties forcing impracticable plans before the public and preventing positive action, while the subject is attracting the attention of capitalists.

We are not advocating any plan in particular, but we recognize in the present question one in which the Society of Civil Engineers can do itself great credit, greatly increase its usefulness, and at the same time promote the good of the city by expressing a fearless and impartial opinion upon the conditions which lie at the foundation of success in the Rapid Transit problem.

We shall give our readers, probably in our next number, a review of the principal plans submitted to the committee appointed by the Society to report on this subject, and will afford to those interested an opportunity to discuss, for the benefit of the public, as well as the Society, their views on the subject.

Centennial Collections of Minerals.

THE Smithsonian Institution and the Agricultural Department will exhibit next year at Philadelphia representative collections of the mineral and agricultural products of the United States, and of its fauna and flora. We understand that it will not be attempted to represent every locality or every species in either department. The minerals of economical value will be exhibited by typical specimens, illustrating the different varieties.

Meanwhile, the Philadelphia Academy of Natural Sciences has taken in hand a cognate matter, the nature of which will appear from the subjoined circular of its committee :

SIR : At a late meeting of the Academy of Natural Sciences, a committee of its members was appointed to seek the co-operation of scientific men throughout the country, to aid in securing a collection of ores, the rarer minerals, and other objects of Natural History of the United States, for exhibition at the coming Centennial celebration. It is no longer to be expected that the means to defray the expenses of collecting and forwarding such objects can be raised by private subscription, nor by appropriation by the United States; still less by the State of Pennsylvania. The only chance of obtaining such a collection, then, is by appealing to individuals and corporations to forward and reclaim the objects at their own expense and risk: but we pledge the best efforts of this committee to ensure their safety both while here on exhibition, and during their return ; as also, their proper arrangement in the series. The committee will endeavor to secure a suitable place for the storage of the contributed articles before they are unpacked, as well as a suitable position in the Exhibition for their proper display.

We earnestly commend to your notice the scientific value of such a loan collection, and request you to do your utmost to assist in gathering it together.

Rare and choice specimens will be lost and cannot be properly studied in a State collection, while they are of immense value in a scientific collection.

It is intended to insure the objects while in the exhibition building, and also, to appoint special detectives to guard them both by day and night. All small objects will be placed in glass cases.

A card containing more minute details relative to the kind of specimens asked for, the manner of forwarding, etc., etc., will be sent to each proposed contributor, and it is hoped that by careful attention to its requirements all loss from theft, carelessness, or breakage may be avoided.

Prof. PERSIFOR FRAZER, JR., Chairman.

Dr. F. A. GENTH,	Dr. G. A. KŒNIG,
JOS. A. CLAY,	Dr. F. GOLDSCHMIDT,
Rev. E. R. BEADLE,	WM. S. VAUX,
Prof. J. P. LESLEY,	C. S. BEMENT,
Prof. JOS. LEIDY,	JOS. WILCOX,
CHAS. M. WHEATLEY,	S. R. ROBERTS,

Committee.

NOTE.—Persons who contemplate contributing specimens to this collection, are requested to notify the chairman in writing, at the earliest possible date, stating approximately the number and size of the objects they propose to loan.

We have no doubt that the Committee, many of whom are excellent mineralogists, will be able to make complete and effective arrangements for the care of specimens entrusted to them, and for the safe return of such specimens to their owners. There are many rare and costly crystals now adorning private collections, which ought to be got together for the delectation of connoisseurs. Will not our mining schools loan portions of their collections for this purpose? We think there is but one thing required to effect it—the personal assurance of the gentlemen of the committee as to their ability to protect the loan. Professor FRAZER'S address is 225 South Sixth street, Philadelphia. *

The Secret Out.

THE *Bulletin* of March 26th devotes four columns of the valuable space usually occupied by extracts from other journals, to a frank confession of the reasons of the strange treatment of the "Scientific Ore Commission" by the American Iron and Steel Association, which appointed it first and ignored it afterwards. The whole trouble, as it now appears, was not that the Association was "depressed" on account of the state of trade, but that it was "appalled" by the discovery that Mr. RAYMOND, one of the appointees, had made, at Liege in Belgium, "one speech too many for his reputation." The Association was so much appalled at this fact, that, after pondering over it a little more than a year, it expressed its horror by inviting Mr. RAYMOND to attend as a guest a dinner in Philadelphia, in honor of the men he had addressed at Liege in such an appalling manner. At that dinner, Mr. RAYMOND, as well as many other persons, thought the guests were insulted by a speech of Mr. JOSEPH WHARTON. But it now appears that, being one of the guests himself, he had no business to think they were insulted, or to say so ; and his course in keeping silence upon the subject until the insulting speech was printed in the *Bulletin*, and then speaking his mind upon it, was the most appalling thing of all. Finally the Association still further lost confidence in Mr. RAYMOND as a "suitable person to collect and analyze Centennial ores," by reason of two dreadful facts: first, the ENGINEERING AND MINING JOURNAL deprecated the policy of asking an increase, at this time, in the tariff on iron ; and, secondly, the Delegates of all the Territories at Washington urged Congress to make the usual appropriation for the collection of mining statistics in the West, of which Mr. RAYMOND has had charge for seven or eight years. The "discovery," as the *Bulletin* neatly calls it, that Mr. RAYMOND was widely acquainted with the mineral resources of States and Territories outside of Pennsylvania, was the only remaining proof that anybody could ask of his unfitness for "collecting and analyzing" that variety of ores known as "Centennial."

The case against RAYMOND is evidently complete. He *has* made too many speeches for his reputation ; he *was* invited to Philadelphia (and, O you cruel Mr. SWANK !) then and there invited to make another ; he *did* think the speech of JOSEPH WHARTON a piece of stupid impertinence, and *when it was printed*, he said so, without reflecting that Mr. WHARTON had paid for the dinner ; he *did* deprecate the policy of asking an increase at this time in the tariff on iron, and he has not changed his mind about it by reason of any marked improvement in the iron trade since the tariff was raised ; he *is* Commissioner of Mining Statistics, with headquarters ostensibly at New York, and actually wherever he happens to be ; in short, he is just such a wretch as Brother SWANK'S fancy paints him—a "compound of science and selfishness," who foolishly "risked his place on the Scientific Ore Commission," and to punish whom, the really modest, distinguished and able gentlemen composing the remainder of that Commission had to be slighted in a lump !

We haven't a word to say in defense of this monster of a RAYMOND ; but why didn't the Association deal with him long ago? The appalling speech at Liege was made months before the appointment of the Scientific Commission ; and the outrage upon meek Mr. WHARTON was committed months afterwards. Why was Mr. RAYMOND appointed at all? Why was he never dismissed? Why don't you dismiss him *now?* He is in a position to damage the Association seriously. Only think : he might go down to Philadelphia and "advise" Mr. SWANK, and then charge the Association with his traveling expenses ! For it was solemnly promised, you know, that the traveling expenses of the members of the Commission should be paid, whenever it was necessary for them to visit Philadelphia?

Mr. SWANK, however, need have no such dire apprehensions. It is sufficiently clear that the article in the *Bulletin* was not inspired by him, nor do we

seriously think it proceeded from personal malice towards Mr. RAYMOND. It is simply an attempt to shift the issue in the case, and change into a personal controversy what ought to be, and, so far as we are concerned, will remain, a serious arraignment of the Iron and Steel Association for a course of procedure, relative to the Centennial exhibition of iron ores, which has practically defeated the plan. We hold the Association responsible for this failure; and from that responsibility it will not escape by attacks upon individuals. Our own allusions to Messrs. MORRELL and WHARTON were made necessary by their appointment on a second committee to carry on what we are forced to consider, so far as they are concerned, a sham.

When the Association pretended to undertake this work, we encouraged and supported it to the best of our ability. After it had ridiculously failed (whether by malicious intention or by innate inefficiency) we urged it to get out of the way. We pressed upon it the duty of recognizing, at least by thanks, the scientific men who had promised co-operation at its request. It is very evident that no sensible suggestions from any quarter are likely to be accepted; and the course now pursued by the persons who manage the Association furnishes unfortunate corroboration of the assertions, coming to us from several quarters, that the object of Mr. MORRELL has been from the beginning, to defeat the thorough exhibition proposed by volunteering to manage it, and then—"managing" it.

Did the American Iron and Steel Association ever appropriate one cent for the advancement of the metallurgy of iron? Did it ever say or do anything to lessen the cost of the production of iron? Has it not confined itself to one open object,—the maintenance of a high tariff—and one other object, less open,—the prevention of increase in production outside of Pennsylvania? The *Bulletin* may make as many side-issues as it chooses; *these* are the conundrums which it is bound to answer. As a small and moribund concern, existing for a special commercial purpose, the American Iron and Steel Association need not fear our opposition. We would not even call it a "Compound of Science and Selfishness." Half the epithet could be spared. But as a pretentious and disingenuous concern, professing to occupy a field which it cannot cover, to meddle in matters which it does not understand, to speak for the iron and steel business of the country, to thwart the endeavors of those who are pursuing the real and permanent good of that business, to get in the way and hinder where it lacks either the ability or the desire to help, this Association is in danger of being pronounced a humbug and a nuisance. The managers know it; and that is exactly what ails them.

We return in conclusion to one personal matter. Mr. RAYMOND is excessively anxious to have it understood that, in his speech at Liege, he did not call Philadelphia an inland town. It was Pittsburgh to which he applied this degrading appellation. The people of Pittsburgh, being less sensitive on the point, will doubtless forgive him. *

Miners' Outrages in the Anthracite Regions.

ADVICES from every part of the coal regions tell of outrages committed by the strikers on those of the men who are willing to work for the wages offered by the operators or companies. The following are a few of these reports; our space is much too limited to publish the whole list:

On the 17th instant, white miners attacked and brutally beat the colored miners employed by the Troy Coal Company, at Straitsville, Ohio, and drove them off. All the colored miners left Straitsville, except two, who were too badly wounded to leave. The rioters burned the company's store, together with its contents, causing a loss of from $10,000 to $16,000, and threatened the lives of the superintendent and the foreman, warning them to leave, which they did. The Governor was applied to, who sent the Adjutant-General to Straitsville to inquire into the condition of affairs.

MAUCH CHUNK, Pa., March 29, 1875.

Intelligence was received here this morning, about nine o'clock, of an outbreak in the collieries at Buck Mountain, Eckley, Drifton, Jeddo, Ebervale and Hazleton by a large mob of miners in a state of frenzied excitement. They started simultaneously at Buck Mountain and Eckley with the determination to visit all the mines in their neighborhood. They disarmed the special police force from Philadelphia stationed at Buck Mountain and took the arms, sixteen shooters and revolvers, with them. They then went to Jeddo, where policeman King was shot in the head, but not fatally wounded, and policemen Warner and Meyer were badly beaten with clubs and their weapons taken away. Each place visited—viz., Eckley, Dritton, Jeddo and Ebervale—the men were forced to go with them. They also called at Mount Pleasant Colliery with the avowed determination to compel the men to quit work, although Mr. Taggart is paying those in his employ the rates of 1874.

HAZLETON, Penn., March 30.—A telegram received this morning from Audenried states that an armed force of miners, which began organizing last night, was *en route* for this place. They compel others to join them, and intend to visit Treskow and Beaver Meadow, collecting new recruits as they advance.

Many shots were fired last evening by the rioters while rallying their forces, five of which went through a window of the Yorktown Company's store. At Beaver Brook two of the firemen were driven from their work, and one of them was compelled to join the rioters.

There is now an admirable opportunity for the Miners' Union *to put in practice* the following *Resolutions*, to which Mr. C. BEN JOHNSON, the editor of the *Workingman*, and an influential member of the Union, called our particular attention:

"*Resolved*, That this Board does not, nor will not, acknowledge the violations of law, and riotous outrages perpetrated by any mob nor body of lawless men, claiming to be members of our association, unless clear proof can be shown that they are so connected, and be it further

Resolved, That this Board does positively condemn all such unlawful outrages against the laws of the commonwealth, as they are quite contrary to the principles of our organization.

Resolved, Any member of the M. & L. B. A., who shall be found guilty of any such conduct and violation of law, shall, on proof thereof, be expelled from said association, and reported to the officers of civil law."

We shall be pleased to note any instance of the Union expelling and handing over to justice any of its members for participation in these outrages. It certainly cannot be difficult to establish the fact of their participation in them.

Let the Union now prove its words by its acts or openly avow these proceedings as authorized by it. "Resolutions" will not suffice, let us have acts, gentlemen.

The Death of Mr. Daddow.

WE regret to learn from the St. Clair, Pa., *Review and Chronicle*, of the death of Mr. SAMUEL HARRIES DADDOW, one of the earliest members of the American Institute of Mining Engineers. Mr. DADDOW was a Cornishman by birth, but spent the greater part of his life, we believe, in this country, where he was engaged in mining. At the time of his death, on Tuesday, March 23, he was about 48 years old. He had worked his way up from the position of a common miner to that of a superintendent and manager, and his ambition and industry had made themselves felt in the literature as well as the practice of his profession. He was the author of a number of inventions, of which the miners' safety squib, patented by him, was probably the most successful. Mr. DADDOW's writings did not do justice to his character. They displayed too often the deficiencies of his early education—not so much in style (for he generally expressed himself with force and clearness) as in the lack of scientific training, which exhibited itself when he attempted to generalize and theorize upon his laborious and voluminous observations. This is a matter involving habits of thought, which are scarcely ever formed by those who attain mature years before commencing to study science. In *Coal, Iron and Oil*, a work of which Mr. DADDOW was joint author with Mr. BANNAN, a great deal of valuable information is mixed with a great deal of extravagant and unwarrantable theory; and Mr. DADDOW did not shrink from maintaining the views he had evolved from nature and himself, though they brought him into conflict with the best scientific authorities and with hosts of recorded, undisputed and indisputable facts. There was something admirable in his confidence and obstinacy, combined with his tireless activity. We have often wished that men more thoroughly prepared to investigate problems in science would manifest half as much zeal and perseverance. We considered Mr. DADDOW's views on numerous points to have been highly erroneous; but we respected at the same time his energetic and conscientious advocacy of them. Personally our relations with him were always friendly; and our own impressions of him are confirmed by the testimony of his friends and neighbors to his private virtues.

One feature of his character and life deserves special praise. He was sincerely devoted to the welfare of the workingmen—not after the manner of those blatant demagogues who would gladly perpetuate the ignorance by which they thrive, but in the deeper spirit of one who knew that education constitutes the best protection for labor. For years he maintained at St. Clair an evening school, and taught without remuneration the laborers and miners and their children. Those who know what is the strain upon mind and body involved in the work of teaching, will be ready to confess that one who gave himself freely, for the love of his fellows, to such a sacrifice, furnished the best proof of a profound, wise and earnest philanthropy. This spirit is rarer than refinement and culture; but without it, they are barren and useless to mankind. *

CORRESPONDENCE.

The Society of Civil Engineers and Rapid Transit.

111 Broadway, NEW YORK, March 31, 1875.

TO THE EDITOR: SIR—I have just received a copy of your Journal, of the 20th inst., containing in its editorial columns an article concerning the action of the American Society of Civil Engineers on the report of the Committee on Rapid Transit. As a matter of justice to the large number of members of the Society, whose opinions differ from those you express, I request room for a brief statement.

You omitted to state in your article, that the resolution directing a committee to "recommend plans for rapid transit," was passed at a meeting on September 2d, at which but 13 members were present, and that of that small number, several were ignorant of the scope of the resolution, and have since expressed decided disapprobation of it. You omitted to state, that the appointment of that committee was not anticipated by the members of the Society, no similar committee ever having been appointed or suggested publicly. You were misinformed as to the vote by which the resolutions quoted by you, relating to the publishing of the report, were passed on the 3d of February. Those resolutions were passed without a dissenting voice in a meeting of nearer fifty than fifteen members. * Pardon my correction of your errors, but as your argument is based largely on the facts as you understood them, it is important that a correct statement of facts should be made. The resolution which was passed by a vote of 8 out of 15, was at the meeting held on March 3d, and related in no way to the Rapid Transit report. Your remarks as to the injudiciousness of having the Society compromised by a vote of a few members at an ordinary meeting are very just, and apply with especial force to the action of the small meeting of September 2d in attempting to launch the Society into a novel and most dangerous policy.

We hold, (and by this I mean not an impersonal editorial WE, but a large and respectable portion of the members) that it does not come within the

*Our statements were based on official information, and we have no reason to doubt its correctness.—Ed. E. and M. J.

province of the American Society of Civil Engineers to investigate and pass judgment, *as a body*, upon schemes for local improvements. We hold that it is impracticable for five hundred engineers, scattered from Maine to California, to express a definite opinion, *as a body*, on the best plan for a special work of construction. We hold, that even if it was practicable to do so, the society has no right and no business to call on members to give gratuitously their learning, their experience, their judgment, which are to them their means of procuring a livelihood, for the benefit of a public or a corporation which has not sought their advice.

We hold that the sole object of the Society is the professional improvement of its members, and that can best be attained by each imparting to the others, (by written statements of valuable facts which have come within his experience, and oral discussions of points of principle and practice,) what he is most familiar with himself.

We hold that the appointment of special committees to investigate and report upon the causes of accidents to structures, the means of procuring uniformity of practice in details of design and construction, in experiments, in technical nomenclature, and kindred subjects, is a most valuable means of obtaining, and disseminating among the members, such information, and should be encouraged.

But above all we hold that no member should be permitted to procure from the Society an advertisement of a project which he cannot get capitalists to favor on its merits, by having himself appointed Chairman of a Committee to report favorably upon it. It is needless for us to disclaim any intention of applying this remark to the gentlemen composing the Rapid Transit Committee. Their characters are too well and favorably known. But the danger lies in the fact that a committee on almost any subject could be appointed precisely as that committee was, and the reputable portion of the Society would find it out too late, and be met with the cry "Oh! we are a legally constituted committee, and it is discourteous to refuse to endorse our report, and besides it shows fear on your part."

With regard to the report on Rapid Transit, the more I read it, the less reason I see for the 81 pages of solid print it occupies, for exclusive of Mr. Forney's admirable appendix A, the whole matter is summed up in the following excellent sentence from the seventeenth page:

"We believe that varied plans must be made, that the designs must conform to local requirements and circumstances in each part of the city, so as to inflict the least possible damage and annoyance, and above all, that the plans must be selected by the capital which is involved to carry them out, and approved by a competent board of commissioners."

If, having said this, the committee had stopped, they would have saved themselves a great deal of valuable time, the Society a great deal of expense, and all parties a great deal of bad feeling, and would have given as much information on the subject of rapid transit as they now have.

J. J. R. Croes.

The Minerals of South-Western Pennsylvania.

Remarks of Dr. T. Sterry Hunt on Mr. E. C. Pechin's paper.*

Mr. Pechin's interesting paper suggests comparisons of the iron ore of the Connellsville region with those which abound in Southeastern Ohio, where they have long been mined to supply the numerous blast-furnaces of the Hanging-Rock district. The chief supply comes from what is there known as the limestone-ore, from the fact that it rests upon a limestone stratum which here overlies the Coal No. 6, known a little farther north as the Great Vein or the Nelsonville or Straitsville coal. This ore forms a bed from a few inches to a foot, and in some places two and three feet, in thickness. In one locality, in Vinton County, 10,800 tons of ore were taken from less than two acres, and in another the yield of three acres is said to have been 23,000 tons. These deposits are largely mined both by stripping and by drifting, and it is estimated that twelve inches of ore can be profitably mined by the latter method in hard sandstone, and even six inches in soft shales. If we take the specific gravity of the ore to be 3.125, or two and a half times that of coal, a continuous layer of ore, a foot in thickness, would yield nearly 4,000 gross tons to the acre. The cost of mining and delivering the ore to some of the furnaces in Gallia County is stated at $2.50 a ton, and those who purchase their ores, pay from $3.00 to $5.00, according to quality and locality. The books of one furnace in Milton, lately examined by me, showed the average cost of ore of forty per cent., delivered at the furnace, in 1872, to be $2.71 per ton, while in 1874, the contract price for mining and delivering varied from $1.50 to $2.25. This limestone ore is but one of many bands of iron ore which in this region, from the Ohio River northward to the Hocking Valley and beyond, are found interstratified with the lower coal measures. Higher in the series, between the coals 6 and 8, there are very large deposits of ores described as occurring in the Sunday Creek Valley, and ores are also mined at several ore-horizons lower down. The iron ores hitherto mined in this region of Southeastern Ohio, are the blue ore or carbonate and the red ore, by which is designated the limonites produced by the alteration of the carbonate. I have, however, observed in this region a third kind of ore which seems, from its unlikeness to the others, to have been neglected. It is a dark red, hard, compact hematite with a specific gravity of about 4.5, and containing from 55.00 to 60.00 per cent. of iron. It is found a little above coal 1, and also above the coals 6 and 8, and if, as there is reason to believe, abundant, will prove an important source of iron. This occurrence of the anhydrous peroxyd in the coal measures is also a fact of some mineralogical interest. Carbonates and limonites lying below the coal No. 6, or the Great Vein of dry-burning coal, are extensively mined along the western border of the coal in Perry County, and smelted at Logan, and at Zanesville and Columbus, in the latter cases with the aid of the coal just named. These ores are sold, delivered on the railroad, at from $3.00 to 3.25 a ton, and in the raw state yield about forty per cent. of iron. The resources of this region for the production of pig iron are very great, and the supply of ore will last as long as the coal itself, since each ton of the ore requires a ton of coal to smelt it. Hitherto charcoal has been the fuel chiefly used, but this is becoming scarce and the raw coals of the Hocking Valley, and, farther south, those of Jackson County, are employed with great advantage in the blast furnace. No region so accessible as this probably offers greater advantages for the cheap manufacture of iron, from the association of excellent furnace coal with limestone and native ores, while the large and increasing exportation of the coals of this region to northern markets is already causing the rich iron ores of Lake Superior to find their way as return freights to be smelted at Zanesville and Columbus. In the near future, the necessity of providing cheap iron in this country must, I think, lead to the transfer of the manufacture to regions like this, and the geographical position of Southwestern Ohio will doubtless make of it one of the great iron producing centers of the country.

* Before the American Institute of Mining Engineers, at the New Haven meeting, February, 1875.

American Method of Treating by Distillation the Zinc-Silver-Lead Alloy, Obtained in the Desilverization of Lead.*

By A. Eilers.

ADDENDA.

Although not strictly within the scope of this article, I will add here for the satisfaction of those who think that no market-lead, pure enough for the manufacture of white-lead, is made in this country, that the Pittsburgh works, as well as two others, do regularly produce an article of unsurpassed purity.

Since new and large desilverization ketties have been introduced and so set as to prevent an inconvenient cooling of the upper part during skimming, the silver contents of the refined lead have been brought down to the low figures of from 4 to 8 grammes in a ton. These limits can now be maintained regularly. The following is a late analysis by Dr. O. Wuth, of market-lead produced from Utah and Colorado ores, and subjected to desilverization by zinc without a preparatory refining. The sample was taken from one out of 10 charges, all which were made up of lead, obtained from the same ores. This lead is used by the Pittsburgh White-lead Works, which I believe are substantially under the same control as the smelting works:

Ag	0.00042
Sb	0.00051
Cu	0.00007
Zu	0.00038
Fe	trace.
S	0.00018
Pb	99.99844
	100.00000

By comparison with the analyses of the great majority of the foreign brands, used for the same purpose, it will be observed, that the Pittsburgh lead is superior, and ranks with the best made in any part of the world.

* Read before the American Institute of Mining Engineers, at the New Haven meeting, February, 1875.

Eastern Virginia Coal Field.†

By Martin Coryell, Civil and Mining Engineer, Wilkes-Barre, Pa.

This coal area, and the coal from a limited portion of it, has been known for a long time.

In 1817, McClure prepared a geological map to represent the boundaries, and they are not controverted at the present date.

In 1834, Richard C. Taylor made a survey and report on portions of the basin.

In 1835, Prof. W. B. Rogers was appointed by the State of Virginia to make a geological survey and made six annual reports in which this area was included, but the reports and maps were not published.

R. C. Taylor's "Statistics of Coal," published in 1855, gave to the public the details of exploration and production, to date, very perfectly and completely.

Daddow and Bannan's work, "Coal, Iron and Oil," published in 1866, repeated the details before given, and advanced some vague theories respecting the coal field, but gave no new facts.

Macfarlane's work, "Coal Regions of America," published in 1873, under the head of "Triassic Coal," chapter 27, gives what is known from existing publications of the position, geology, and production of the field, making copious extracts from Rogers, Taylor and Lesley, and closes with the remark: "This oldest of our coal fields is yet to see its best days."

The object in presenting this subject is to call attention to the fact that for want of scientific knowledge in mining, mine surveying, and the careful recording of the notes of these, a large amount of capital has been expended in producing a small amount of coal. We have here, within twenty-five miles of navigable tide-water, an area of ninety-six thousand acres of coal measures, having upon it seams, or pockets, of coal of from five to fifty feet in thickness, as proved by workings in various places, which is left unimproved, unproductive, and almost unknown at this day, when cheap fuel, cheap transportation and rapid transit are attracting so much attention.

There are several collieries opened, and producing coal to a very limited extent,

† A paper read before the American Institute of Mining Engineers, at the New Haven Meeting, February, 1875.

the principal ones being Clover Hill, near Appomattox River, on the south-easterly side of the basin, and Midlothian, on the eastern side, near the middle of the field, on the Richmond and Danville Railroad, and only twelve miles from the city of Richmond. In this vicinity are, further, three or four individual operations.

The James River Coal Company, occupying and operating the property of the Carbon Hill Coal Company, is on the north side of the James River, and the coal is here loaded into canal boats from a railroad four miles in length. WILKINSON and DUVAL and the Old Dominion Coal Company, on the south side of the James River, are on the westerly rim of the basin, and load their coal into canal boats in the James River, which is made navigable from the dam built to feed the James River Canal. There are other openings, but the production is very small.

South of the James River, it is generally believed, there is but one seam and that very thick, from twenty to sixty feet, and lying very close to the granite rock. On the north side of the James, four seams are represented at the mines formerly opened by the Carbon Hill Coal Company, and now worked by the James River Coal Company. They were reported as follows, beginning at the bottom :

1. Seam of coal, unknown.....∞ feet.
   Rock.....40 to 60 feet.
2. Seam of coal..... 6 "
   Rock.....12 feet.
3. Seam of coal..... 5 "
   Rock.....50 feet.
4. Seam of carbonite..... 6 "

This section is from the middle (east and west) of the basin, and it is doubtful if the lower seam has ever been found or proved, even with the boring tools.

The latest and only scientific information given to the public is from our fellow member, Mr. OSWALD J. HEINRICH, whose admirable contributions, including map and diagrams, will be found in the first and second volumes of the *Transactions of the American Institute of Mining Engineers.* I believe this to be the only recorded survey of the mines, in all of this area, that can be depended upon.

Mr. HEINRICH has devoted his attention to but a very small area, but with the aid of the Diamond Drill, his superior skill and painstaking industry, is preparing the way for a thorough knowledge of this field.

For the general information of the Institute, I present a specimen of the granite rock taken from the south side of the basin, also the chloritic slate which underlies the coal at the Clover Hill colliery, a very small specimen of the coal from Bright Hope shaft, eight hundred feet deep, and a cross section of the Racoon slope, or colliery, showing the down-throw of the seam, with specimens of the "gangue" taken from the rock against which the coal, in all its purity and solidity, abutted. These specimens also exhibit the grooves made in slipping, termed "slickensides."

The assertion made in the books describing this basin, that the coal lies almost immediately upon the granite, does not apply to those portions of the field that I could examine, for I found at least three hundred feet of this chloritic slate between the coal and the granite. Mr. HEINRICH gives five hundred feet, and his assertions are based on the disclosures of the diamond drill, which gives us a specimen of the granite eleven hundred feet below the surface.

I present a specimen of the natural coke taken from near the south bank of the James River, said to be four hundred feet from the surface. The seam was represented to be six feet thick, very regular; the course of the gangway was east and west on water level. This colliery is considered to be very nearly in the middle of the basin, on an east and west line.

On the western out-crop, the dip of the coal is represented as very flat, say from five to fifteen degrees at those colleries which are worked on the south side of, and near, the James River.

The shafts are seventy-five feet to the coal, which is represented to be in two benches and irregular—the upper bench being from five to nine feet, then from one to three feet of slate, then coal four and a half feet.

The specimen of rock from over the seam of natural coke or carbonite was given me by Mr. TORREY, of the James River Coal Company; it was taken from the rubbish of a shaft sunk near the canal, where the carbonite seam was passed through. It is not known how near the carbonite and this rock come together, or the thickness of the rock, but it is considered to be a trap dyke, forced horizontally between the overlying strata, the intense heat of which coked the coal of the underlying seam.

With this theory comes the report that, as the coke seam is proved westwardly from the Carbon Hill openings, the carbonite or coke descreases, and bituminous coal sets in from the bottom, and at one portion of the gangway, the coal is two feet thick, and very good, and the coke or carbonite is two and a half feet thick, also good, with some slate between, the seam maintaining its total thickness of five feet.

I present a map of thirty-five miles around Richmond, upon which I have marked out the coal areas. I do not pretend to accuracy of detail in this, or in the hand-sketch, or to present them as original or new, but I offer them to provoke discussion and more thorough exploration of a coal area which is neglected and permitted to lie waste, simply because scientific skill and experience has not been called in to investigate it.

Production of Ozone.—Ozone may be easily and abundantly generated in any apartment by means of an aqueous solution of permanganate of potash and oxalic acid. A very small quantity of these salts, placed in an open porcelain dish, is all that is necessary, the water being renewed occasionally as it evaporates. Metallic vessels should not be used.

On some Thin Sections of the Lower Paleozoic and Mesozoic Rocks of Pennsylvania.

BY PROF. PERSIFOR FRAZER, JR.*

IT was my intention to have directed the attention of the members of the Institute to a complete series of rocks representing the older and middle formations represented in Pennsylvania, but time has been insufficient for the purpose, and I have been unable, in the first attempts, to reduce the sections of those rocks, which I have brought with me to this meeting, to the requisite thinness necessary for exhibiting the peculiarities of their constituent minerals.

The rocks represented here belong to the various horizons already mentioned, and include gneiss, ferruginous gneiss, chlorite slate, quartzites, and hydro-mica slates, limestones, dolomites, ferruginous conglomerates, quartz conglomerates, "Potomac marble" (nether member of the Mesozoic series), dolerites, and a syenite.

The order in which these are named is, roughly, the order of geographical position in a section line from S.-E. to N.-W., commencing at the intersection of the Northern Central R. R. with the Maryland line, and ending a few miles from the town of York, and a short distance within the marginal outcrop of Mesozoic red sandstone.

In such a geographical section all the rocks above mentioned would be encountered in the given order except syenite, about which a few words are to be said in a moment. (But this is far from representing the rocks in their geological sequence.) There is nothing of unusual interest to present to your notice in these slates and quartzites. The limestones were carefully searched under 450 diameters microscopic power, but they show no signs of organic remains. One section of a fine grained Triassic sandstone contains a very beautifully banded plate of quartz.

But the objects of greatest interest at present are the specimens of trap. The more fine-grained and compact traps were collected from a variety of places in York and Adams Counties, where they emerge through older rocks (chiefly Trias). I have been permitted by Mr. E. S. DANA, of Yale College, to examine the large and interesting collection of thin sections of fine-grained traps which he has made from the rocks of many localities in Connecticut. It was exceedingly interesting to observe the striking resemblance of them to that of which I have spoken. Both were dolerites, and the specimens from the two States were indistinguishable from each other, both in general external appearance and also under the microscope.

In the cabinet of Mr. DANA, which contains upwards of 150 thin sections of dolerites alone (if I am not in error) there were examples of every variety of external appearance, but save in being coarse or fine-grained, their appearance under a high magnifying power and in polarized light was much the same as the Pennsylvania dolerites.

The specimen which I had supposed to be syenite was so similar, in general external properties, to some of Mr. DANA'S suite that no one could have suspected any great differences in the composition of the two. They were, however, widely different. Whereas the Connecticut specimen exhibited blades of plagioclastic feldspar imbedded in pyroxene, the Pennsylvania variety (from Cemetery Hill, Gettysburg) contained hornblende and quartz. Magnetite occurred quite frequently in both.

This occurrence of syenite in the red sandstone is rare and will be further investigated. This series of slides is offered to the inspection of the Institute, not for its intrinsic merits in their workmanship or material, but as a beginning of the miscroscopic study of the oldest life-bearing rocks.

Effects of Heat and Cold on the St. Louis Bridge.

We have here in St. Louis a bridge with arches of 500 feet; and, to any one who has the proper means of observation, the changes in the elevation of the crown of the arches are very perceptible. In the construction of the work, calculations and allowances were made for the extremes of temperature, through a range of 140°, from the greatest cold in winter to the warmest day of summer, and the calculated difference in the elevation of the center arch of the upper chord above the City Directrix at these two times was about eighteen inches.

The bridge has now long been finished. During the year, the height of the center piers of the top chords of the arches above the City Directrix has been noted almost daily at temperatures which have ranged from 92° to 15° Fah., the elevations being taken with a level from the abutments of the bridge.

(The "height" is that of the center pier of the top chord above the City Directrix):—

Date.	Temp. 3. P. M.	Height in feet.
May 6th, 1874	69° F.	63.548
June 29th, 1874	77° F.	63.688
July 20th, 1874	91° F.	63 757
January 4th, 1875	10° F.	63.241
January 9th, 1875	15° F.	63.065

Between the figures for July 20th last and those for January 9th, which two days are respectively the warmest and coldest of the year, there is a difference in temperature of 107° Fahrenheit, and of 0.692 feet, or nearly 8 5-16 inches.

This is an effect of temperature much less than calculated, due partly to the fact of the iron work being painted white, which lessens the absorption of heat in hot weather, and increases the radiation in cold weather, and also the protection afforded by the roof of the bridge. This latter is strikingly exemplified in the fact that the river, while frozen above and below the bridge, has yet been open under it.—*Railway World.*

* Remarks before the American Institute of Mining Engineers, at the New Haven Meeting, February, 1875.

Rocky Mountain Coking Coals.

[Extracts from a paper recently read before The American Philosophical Society, by Mr. J. BLODGET BRITTON, of the Iron Masters' Laboratory, Philadelphia.]

The four coals from East of the Rocky Mountains, and in the line of the Union Pacific Railroad, exhibited at the meeting of the Society, October 6th, 1874, I have since analyzed, for metallurgical purposes, with the following results:

I.—*Carbon Coal from the mine at Carbon.*

The sample consisted of several pieces and weighed 12 lb.

Water	12.50
Volatile combustible matter	35.47
Fixed Carbon	44.96
Ash	7.07
	100.00

100 parts of the raw coal gave of coke 52.03

The coke was composed of Carbon 86.42
" " Ash 13.58
100.00 including sulphur ... 1.03
" phosphorus trace

II.—*Coal from Alury mine.*

The sample consisted of several pieces and fine stuff, and weighed 21½ lb.

Water	12.95
Volatile combustible matter	32.54
Fixed Carbon	44.56
Ash	9.95
	100.00

100 parts of the raw coal gave of coke 54.51

The coke was composed of Carbon 81.75
" " Ash 18.25
100.00 including sulphur .29
" phosphorus .04

III.—*Coal No. 3 from mine at Rock Spring.*

The sample consisted of a single piece and weighed 18½ lb.

Water	13.40
Volatile combustible matter	35.25
Fixed Carbon	49.81
Ash	1.54
	100.00

100 parts of the raw coal gave of coke 51.35

The coke was composed of Carbon 97.01
" " Ash 2.99
100.00 including sulphur .63
" phosphorus .02

VI.—*Coal from Excelsior mine, at Rock Spring.*

The sample consisted of several pieces and fine stuff and weighed 16½ lb.

Water	10.10
Volatile combustible matter	36.76
Fixed Carbon	51.03
Ash	2.11
	100.00

100 parts of the raw coal gave of coke 53.14

The coke was composed of Carbon 96.03
" " Ash 3.97
100.00 including sulphur .92
" phosphorus trace

NOTES.—The coals swelled very little during the coking. When powdered they each agglutinated and formed into a strongly adhering mass. The coke resembled in appearance the kind produced from the average bituminous coals of Western Pennsylvania.

A portion of the sample from the Carbon mine was subjected for an hour and a half to a temperature of 178° F., and lost in weight 5.72 per cent.; subjected to one hour more to a temperature of 280° F., the loss was increased to 7.31; and again for two hours more to the same temperature, the whole loss was found to be 7.55. Another portion of the same sample was then subjected for three hours to a temperature of 500° F., and the loss was 9.55. The watery vapor was all condensed in a cold glass tube, the tube was carefully weighed and then the water was evaporated from it, and when cold was weighed again; from the loss the weight of the water was ascertained. The coal was then weighed and its loss was found to correspond very nearly with the weight of the water, thus showing that at a temperature of 500° F., little less than water was expelled. A portion of the same coal was immediately put into another tube and subjected for a moment to a low red heat, when more water passed off and condensed in the cold part of the tube; subjected for another moment to a little higher temperature, a dark brown oil passed off and condensed partly with the water and partly in the space of the tube between the water and the coal. The oil emitted a strong odor, the same as the oil produced by distillation from the brown friable liguites of Southern Arkansas and Texas, and, also, the Brackenridge coal of Kentucky, and some of the Cannel coals of West Virginia. The other three coals produced water and oil in like manner, at a low red heat. These coals are certainly not lignites. No mineral rosin or amber-like substance could be detected in them; they were black, apparently not friable, and had all the appearance of belonging to the true bituminous series. If dried at a temperature of about 500° F., or something above, to expel the excess of water, they, beyond doubt, would answer for puddling iron and the purposes of the blacksmith, and their cokes, it is equally certain, would answer for producing pig iron in the blast furnace.

In order to ascertain the value of these coals for steam and illuminating purposes, samples were sent to Dr. CHAS. M. CRESSON for examination, and subjoined is a copy of his report.

OFFICE AND LABORATORY,
No. 417 Walnut St., PHILADELPHIA, Dec. 5th, 1874.

Coals marked "Carbon Mine," "Excelsior," "Mine No. 3" and "Alury," have been examined as to their fitness for the production of steam and for their suitability for producing illuminating gas, Pittsburgh (Penn Gas Coal) being used as the standard of comparison.

The following results have been obtained:

COAL.	Pounds of water evaporated by one lb. of coal.	Gas to the lb. of coal when all of the gas is worked off.	Value of 5 cubic feet of gas in candles	Value of 5 cub. ft when the amount is limited to 4 4 cub. ft per lb. of coals.
				CANDLES.
Carbon Mine	13.42	5 71 cu. ft.	9 52	10.30
Excelsior	13.53	5.54 " "	11.80	12.00
Mine No. 3	12.65	6.06 " "	7.80	12.30
Alury	12.77	5.77 " "	6 90	9.—
Penn. Gas Coal	14.67	5.2 " "	12.	14.—

The heating power of these coals compares favorably with that had from the majority of semi-bituminous and many bituminous coals; it should be burned in boilers adapted for use with bituminous coals.

As gas coals, Excelsior and Mine No. 3 possess fair qualities. They yield a very large amount of gas, and with a little enrichment (either by the admixture of cannel or a small amount of oils) will prove serviceable to the gas maker.

If these samples are from outcrop or from near the surface it will most likely be found that the quality of the coal will improve as it is obtained from a greater depth; so that, without any diminution in the quality, they can compare more favorably with the eastern bituminous coals both for gas and steam purposes.

(Signed,)
CHARLES M. CRESSON, M. D.

Determination of the Composition of the Gases and Slags discharged from Blast Furnaces.

By WILLIAM KENT.

THE materials put into a blast furnace are coal, ore, limestone or other flux, air and moisture. The products are iron, slag, and the so-called waste gases. It may be regarded as an axiom that everything which is put into a furnace comes out of it again. The form of the products is different from that of the charge, but the total weight is the same, and the weight of each chemical element is the same. As the lining of a furnace wears away, the portion abraded increases the weight of the product over that of the charge, but such increase is insignificant, compared with the total amount of the materials passing through.

These considerations suggest a method of determining the weight and the average ultimate chemical composition of the slags and waste gases, provided we know the weight and average analyses of the charges, and the weight and analysis of the pig iron produced. The method is a very simple one, and consists merely in calculating the weight of each element introduced into the furnace in a given time, and subtracting therefrom the weight of each element in the pig iron made the same time. The difference is then divided into two portions, the volatile and the non-volatile. The volatile portion will represent the gases, and the non-volatile the slag. From the figures obtained, the percentages can readily be derived.

To be more explicit: The materials put into the furnace are coal, consisting of carbon, with some hydrogen, sulphur, non-volatile silicates and moisture; ore, consisting of iron, oxygen, sulphur, phosphorus and silicates; limestone, consisting of lime, carbonic acid, and, perhaps, silica and magnesia; and, finally, air, consisting of oxygen and nitrogen, and bearing with it moisture composed of oxygen and hydrogen. The products obtained from the bottom of the furnace are pig iron, consisting of the elements iron, carbon, silicon, sulphur and phosphorus; and the slag, consisting of silicates of lime, magnesia, alumina, iron, etc., with, perhaps, sulphur and phosphorus. The gases at the top of the furnace consist of oxygen, which was obtained from the air, from the ore, and a small portion from the decomposition of the silica which gave up its silicon to the iron; carbon, all that was contained in the coal and limestone, except what went into the pig iron; hydrogen, from the coal and from the moisture of the air; and nitrogen, which was in the air introduced into the furnace, and which passes through it without change.

There may be a slight error in the above assumptions, and the method can scarcely be supposed to give absolutely accurate results, as some of the elements introduced into the furnace are volatile under some conditions and not under others, such as sulphur, phosphorus, zinc and nitrogen; and a small portion of the non-volatile elements may be carried away by the waste gases in the shape of dust. These errors, however, are so slight as to be inappreciable, and the method appears to be accurate enough for most purposes, such as determining the heating power of the gases, and whether the slag has a proper composition. To test this method, the writer has made a calculation of the composition of the

waste gases and slags of the Alfreton Furnace in England, basing the calculation on the data given in PERCY's Metallurgy. The following are the data which are given: the composition of the coal, ore and limestone used, and the statement that every 140 lb. of pig iron produced required 390 lb of coal, 420 lb. of ore, and 170 lb. of limestone.

ANALYSES.

Coal.		*Ore.*		*Limestone.*	
Carbon	74.98	Silica	25.77	Lime	54.4
Hydrogen	4.73	Sesquioxid of iron	60.24	Carbonic acid	42.9
Oxygen	10.01	Alumina	6.58	Magnesia	0.6
Nitrogen	0.18	Lime	3.51	Alumina	0.8
Water	7.49	Magnesia	3.19	Moisture and loss	1.3
Silicates	2.61	Potash	0.74		
Potash	0.07	Manganese	traces		
	100.97		100.03		100.00

The above data are incomplete, as they do not give the analysis of the pig iron, nor the weight of air blown into the furnace and its percentage of moisture. To complete the calculation, the writer was obliged to assume these data, as follows: The pig iron is considered to consist of 94 per cent. iron, 4 per cent. carbon, and 2 per cent. silicon. No sulphur nor phosphorus are given in the analyses of the charges, consequently there can be none in the pig iron. A calculation of the weight of air blown into the furnace can be made, if we assume the analysis of the gases, as given by PERCY, to be correct. The first column below gives the analysis by volume, as given by PERCY; the second, the same reduced to analysis by weight; and the third, the percentage of the ultimate elements:

	I.	II.		III.
Nitrogen	55.35	57.35	Nitrogen	57.35
Carbonic acid	7.77	12.67	Carbon	16.61
Carbonic oxid	25.97	26.79	Oxygen	24.53
Marsh gas	3.75	2.24	Hydrogen	1.51
Hydrogen	6.73	.50		
Olefiant gas	0.43	.45		
	100.00	100.00		100.00

The carbon in the gases came from the coal and the limestone. If 1.44 per cent. of the carbon in the coal went into the pig iron to make the latter contain 4 per cent. of carbon, the remainder, 73.54 per cent. of carbon, or $390 \times .7354 = 286.81$ lb. of carbon came out in the gases for every 140 lb. of pig iron produced. The limestone containing 42.9 per cent. of CO_2, or 11.7 per cent. of carbon, it will furnish $170 \times .117 = 19.89$ lb. The gases then contained $286.81 + 19.89 = 306.70$ lb of carbon for every 140 lb. of pig iron produced. As this 306.70 is 16.61 per cent. of the total weight of the gases, the latter is found by the proportion:

$$16.61 : 100 :: 306.70 : 1846.5.$$

57.35 per cent. of the gases, or 1058.97 lb., consist of nitrogen. A very small proportion of this, $390 \times .0018 = 0.70$ lb., came from the coal. The remainder, 1058.27, came from the air, which consists of 76.99 nitrogen, and 23.01 oxygen. The weight of the air then is $76.99 : 100 :: 1058.27 : 1374.51$ lb.]

The moisture may be estimated at one per cent. of the weight of the air, or 13.75 lb.

The following table shows the calculation of the composition of the gases and slags, the figures being obtained by multiplying the weight of each material charged for each 140 lb. of pig iron, by the percentage of each element contained in it:

		Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Silica.	Potash.	Alumina.	Lime.	Magnesia.	Iron.
Coal	390 lb.	292.42	21.67	65.01	0.70	10.18	0.27	....	....	....	....
Ore	440 "	....	....	75.89	....	108.23	3.11	27.64	14.74	13.40	177.11
Limestone	170 "	19.89	0.26	54.99	....	....	....	1.36	92.48	1.02	....
Air	1374.51"	....	..	316.54	1658.27	....	....	..	....	....	....
Moisture	13.75"	....	1.53	12.22	....	....	....	..	....	....	....
		312.31	23.46	524.35	1058.97	119.41	3.38	29.00	107.22	14.42	177.11
Less Iron, 140 lb.		5.60	..	add 3.20		less Silicon 2.80					131.60
						Oxygen 3.20					
		306.71	23.46	527.55	1058.97	113.41	3.38	29.00	107.22	14.42	45.51
Less Slag, 312.94 lb.		....	....	....	....	113.41	3.38	29.00	107.22	14.42	45.51
Leaves Gases, 1916.69,		306.71	23.46	527.55	1058.97						
Percentage of Gases,		16.00	1.22	27.53	55.25						
Percentage of Slag,		....	..	....	....	36.24	1.08	9.28	34.26	4.60	14.54

The results of the above calculation of the composition of the gases compare as follows with the analysis given by PERCY.

	Carbon.	Hydrogen.	Oxygen.	Nitrogen.
Calculation	16.00	1.22	27.53	55.25
Analysis	16.61	1.51	24.53	57.35

The analysis of the slag is not given by PERCY. The results obtained by calculation seem to agree with the results of analysis as nearly as could be expected, after making so many assumptions in the absence of sufficient data. To test the method of determining the composition of the gases by calculation properly would require a complete set of analyses of charges, averaged for a considerable period of time.

The above described method does not give accurate results, if we wish to know the proximate, instead of the ultimate, composition of the gases, for we cannot determine *a priori* whether the hydrogen is in the free state, or combined with carbon, oxygen or nitrogen. If anthracite coal, however, is used for fuel, and the charge does not contain water, the hydrogen in the gases is greatly diminished, and the proximate constitution can be very nearly determined, as the carbon will be in combination with the oxygen as carbonic acid and carbonic oxid, the proportions of each of which will depend upon the proportions of carbon and oxygen in the gas.

Stevens Institute of Technology, Department of Engineering, March, 1875.

Mining Statistics of New Jersey.

From the Annual Report of the State Geologist, for 1874.

Iron Ore.—Amount mined in various years, in tons:

1871	450,000
1872	600,000
1873	665,000
1874	525,075

The falling off in the product of our iron mines during the past year is owing to the depression in the general business of the country. That it is not greater is due to the large amount of ore containing manganese, and which is free enough from phosphorus to be used in making Bessemer steel. The demand for our ores for making steel is constantly growing as their good qualities become better known.

Zinc Ore.—There has been mined in 1874, 13,500 tons of zinc ore, against 17,500 tons last year.

Greensand Marl.—The statistics of marl have not been collected this year. They do not vary largely from those of last year, when 134,734 tons were carried on railroads in addition to the amount hauled away from the pits by teams.

Lime.—No attempt has been made to collect full returns of the amount of lime burned in the State. The New Jersey Central Railroad has carried 86,250 bushels in 1874, but this is only a fraction of the whole amount.

Notes.

The Pittsburgh Manufacturer, speaking of the strike or lock-out among the puddlers of that city, says: There is but little change in the situation relating to the lock-out since last week. Both parties seem determined, the boilers not to work at less than scale rates, and the manufacturers not to pay on 2 50 rates more than $4 50 for boiling. About 20 furnaces are at work in the city at $4 50, and we have a good authority that 40 boilers have been engaged to run another mill.

Washington Territory Coal.—The Seattle (W. T.) *Intelligencer* of the 3d instant says: "There was a report current on the street yesterday to the effect that the Seattle Coal Company had entered into a contract with the Central Pacific Railroad Company to supply them with coal for a period of three years, to the extent of 5,000 tons per month, and that Captain Blair, the owner of a large number of vessels plying on this northern route, having secured the contract for its transportation, would immediately put his vessels on the route between there and San Francisco.

Cost of Mining Work in Lake Superior Copper Mines.—Statement of work done at the Atlantic Mine for the year ending December 31, 1874, and the cost of the same:

UNDERGROUND EXPENSES.

Stoping 4451 1/2 2/16 cubic fathoms, at $17 33 1/3	$77,141 78
Drifting 686 4-12 feet at $14 42 1/4	9 899 30
Sinking No. 3 shaft, 7 2-12 feet at $30	215 00
Timbering, tramming and day work	26,990 46
Powder, candles, fuse, &c., used on Company account	1,638 20
	$115,884 74

Cost of Tunnels.—The Mount Cenis tunnel has cost $38,000,000; but this was all rock, requiring laborious and expensive blasting. There is a tunnel in England—that of Kilsby, which has been bored in softer material, like that to be constructed under the English channel, but in which also vast quantities of water often drowned the works, requiring thirteen steam-engines, 200 horses, and 1,5000 men, working night and day. The engines pumped from the quicksand alone 10,000 gallons of water per minute; notwithstanding this, the expenses were, after completion, scarcely half as much per mile as they were in the Mount Cenis tunnel; and if the English channel tunnel is to cost at this rate, it is estimated at only $28,000,000; if at the rate of the Mount Cenis tunnel, it would cost some $80,000,000; but then with our present experience, we could now bore the Mount Cenis tunnel, if not for half the original cost, at least for two-thirds, or $25,000,000.

Origin of Peruvian Niter.—The niter districts of Peru form a plateau of a mean elevation of 3000 feet, 15 to 20 leagues broad, and several hundred in length. ANTONY GUYARD, in the *Moniteur Scientifique*, proposes the following theory to account for its formation: He supposes that there has been an epoch when nitrogen compounds were disengaged from the volcanoes, just as there were sulphuric, hydrochloric and boracic acid epochs. The alkali is derived from the porphyritic mountains, which have also given rise to the beds of kaolin and other clays. In general, the saltpetre exists in the form of saccharoid deposits, composed principally of nitrate of soda and chloride of sodium, mixed with nitrate and iodate of potash, chlorides of magnesium, aluminum and calcium, sulphates of lime, magnesia and alumina. The earthquakes of these regions he considers to be subterranean electric storms. The author opposes the view that the niter beds are derived from decomposed guano, and the iodates from seaweeds. He has also shown that the coloring matter of the niter beds is not of organic origin, the yellow being chromic acid and the violet manganic.

On Hydrogenised Iron.—M. L. CAILLETET.—On decomposing with the battery a solution of neutral chloride of iron mixed with sal-ammoniac, we obtain at the negative pole metallic iron in the form of mamillary masses, brilliant, brittle, and hard enough to scratch glass. This iron, after being washed, disengages, either under water or any other liquid, bubbles of a gas, which is pure hydrogen. In the air the iron only loses a part of the hydrogen which it contains. A specimen weighing 0·9 grm. kept for fifteen days in an open tube, gave, when heated, 18 c. c. of gas, or more than half of what it contained at the moment of its preparation. If a fragment of the iron is placed under a test-tube filled with water heated to 60° or 70°, the escape of gas becomes tumultuous. 1 volume of iron contains from 248 to 235 volumes of gas. If a piece of hydrogenised iron is approached to a burning body, the disengaged hydrogen burns, and the metal is

surrounded with a light flame, like that of a match steeped in alcohol. When iron has lost its hydrogen by heat, it cannot be resumed. If we use as the negative electrode of a volta-meter a plate of galvanic iron previously heated, the hydrogen of the decomposed water escapes in abundance along the metal, but not any of it is taken up. Galvanic iron may be readily powdered, but after being heated it re-assumes a certain degree of ductility. Hydrogen when associated with iron imparts to it a considerable coercitive force.—*Comptes Rendus.*

Pennsylvania Railroad Directors.—The ticket nominated by the Committee of Stockholders to serve as directors of the Pennsylvania Railroad Company, was duly elected, as follows: THOMAS A. SCOTT, JOSIAH BACON, WISTAR MORRIS, JOHN M. KENNEDY, ALEX. J. DERBYSHIRE, SAMUEL M FELTON, ALEXANDER BIDDLE, N. PARKER SHORTRIDGE, HENRY M. PHILLIPS, J. SCOTT, of Pittsburgh. The Board met at the Philadelphia office, on Wednesday, for organization, when the old officers, including Colonel THOMAS A. SCOTT as President, Messrs. GEO. B. ROBERTS, A. J. CASSATT and EDMUND SMITH as Vice-Presidents, JOSEPH LESLEY, Secretary, BAYARD BUTLER, Treasurer, and FRANK THOMSON, General Manager, were re-elected.

Relative Cost of Water and Steam Powers.—The cost of the water power equipment at Lowell was, for canals and dams, $100, and for wheels, etc., another $100, per horse-power. But this, as a first experiment, was more costly than a similar equipment need be. At Saco the expense incurred was $175 per horse-power; but at a later period, for turbines with high heads, the expense would be less. A construction and equipment, solidly carried out, with the latest improvement in wheels, would not cost over $200 per horse-power, and would, under favorable circumstances, cost less. An estimate at Penobscot was for $112 50 per horse-power. If the construction be with wooden dams, and the equipment with lower grade wheels, then the cost would be about $50 per horse-power; and although the construction would be less permanent than the more solid, it would outlast any steam apparatus. On the other hand, Fall River estimates of steam equipment, exclusive of foundations and engine-houses run from $100 to $115 per horse-power. A Boston authority gives $115 per horse-power for nominal 300 horse-power and upward, inclusive of foundations and masonry. Similarly a Portland authority places it at 100 per horse-power. The actual cost of steam equipment in the waterworks of various cities of the United States varies from $150 to 300 per horse-power. As to the cost of work done, it appears that in Philadelphia, in 1857, the cost of raising water by water-power was only 2½ cents per 1,000,000 gallon-feet; whereas the cost by steam-power was in four cities 8 3-10, 11 1-10, 19 1-10 and 29 2-10 cents, with coal at $5 50 per ton.—*The Water Power of Maine.*

COAL TRADE REVIEW.

Import Duty on Coal.

Anthracite free. *Bituminous*, per ton of 28 bushels, 80 lb. to the bushel, 75c., gold.

All *slack*, or *culm*, such as will pass through a half-inch screen, per ton of 28 bushels, 80 lb. per bushel, 40c., gold.

Not otherwise provided for, per ton, 40c. gold.

This is the only report published that gives full and accurate returns of the production of our Anthracite mines.

NEW YORK, April 3, 1875.

Comparative Statement of the Production of Anthracite Coal for the week ending March 27:

	1875.		1874.	
	Week.	Year.*	Week.	Year.
Wyoming Region.				
D. and H. Canal Co	47,773	590,820	54,338	495,873
D. L. and W. RR. Co	56,455	541,831	47,607	507,310
Penn. Coal Co.	1,733	227,983	14,480	240,187
L. V. RR. Co.	7,656	219,081	20,552	218,275
P. and N. Y. RR. Co.	1,681	5,467	1,119	11,152
C. Rit. of N. J.	2,457	48,769	36,918	224,543
Penn. Canal	..	..	..	..
Lack. and B. RR.	..	28,696	..	28 831
	117,735	1,662,647	175,014	1,726,171
Lehigh Region.				
L. V. RR. Co.	4,338	99,435	61,795	612,957
C. RR. of N. J.	201	5,071	27,009	133,245
D. H. and W. B. RR.	441	6,132	139	2,640
	4,980	110,638	88,943	748,842
Schuylkill Region				
P. and R. R. RR. Co.	17,159	213 053	117,999	721,999
Shamokin and Lykens Val.	22,216	146,176	10,103	115,655
	39,365	359,229	128,102	837,645
Sullivan Region.				
Sul. and Erie RR. Co.	396	3,130	331	5,842
Total	162,476	2,135,644	392,390	3,318,500
Increase	..	..	..	..
Decrease	223,914	1 182,856	..	..

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about five per cent. of the whole production

The following table does not give the entire production of our bituminous mines, but it is by far the fullest report published.

The Production of Bituminous Coal for the week ending March 27, was as follows:

TONS of 2000 lb., except where otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lb.	34,854	257,680
Barclay Region, Pa.		
Barclay R.R. tons of 2240 lb.	6,103	71,852
Broad Top Region, Pa.		
Huntingdon & Broad Top R.R.	6,057	47.747
East Broad Top	471	5,878
Clearfield, Region, Pa.		
Snow Shoe	2,013	16,831
Tyrone and Clearfield	22,441	165,464
Allegheny Region, Pa.		
Pennsylvania R.R.	2,738	38,679
Pittsburgh Region, Pa.		
West Penn. R.R.	3,122	39,569
Southwest Penn. R.R.	121	1,299
Penn. and Westmoreland gas coal, Pa. RR.	5,306	139.552
Pennsylvania R.R.	6,129	55,936
Kanawha Region, W. Va.		
Chesapeake and Ohio R.R.	3,505	26,357

The Production of Coke for the week ending March 21.

Tons of 2000 lb.

	Week. Tons.	Year. Tons.
Tyrone and Clearfield	12	233
Alleghany Region	11	42
West Penn. R.R.	1,245	12,043
Southwest Penn. R.R.	10,925	100,367
Gas Coal, Penn. R.R.	220	7.476
Pittsburgh Coal, Penn. R.R.	2,160	17,472

Production of Bituminous Coal, 1875.

Tons of 2000 lb.	Jan.		
Blossburgh Region	19,039	..	..
Barclay Region	28,605	..	..
McIntyre Coal Co.	5,911	..	..
Broad-Top Region	11,607	..	..
Cumberland Region	87,579	..	..
East Broad Top	1,790	..	..
Snow Shoe	6,277	..	..
Clearfield Region	47,453	..	..
Alleghany Region	14 887	..	..
Pittsburgh Region.			
West Penn. RR.	16,055	..	..
Southwest Penn. RR.	413	..	..
Gas Coal, Penn. RR.	61,893	..	..
Pittsburgh Coal, Penn. RR.	22,172	..	..
Saw Mill Run RR.	287	..	..
Cleveland and Pittsburgh RR.	20,882	..	..
Pittsburgh, Cincinnati and St. Louis RR.	50,598	..	..
Erie and Pittsburgh RR.	11,998	..	..
Pittsburgh, Fort Wayne and Chicago RR.	13,718	..	..
Castle Shannon RR.	7,998	..	..
A. V. & P. R.R.	242	..	..
Pittsburgh and Connellsville R.R.	25,850	..	..
Monongahela Nav. Co.	..	..	..
Keeling & Co	.	..	..
Weltencal & Gormley	1,961	..	..
J. W. Carlin & Co.	..	..	..
Pittsburgh Va. & C. R.R.	2,346	..	..
St. Louis Region.			
St. L. A. & T. H. R. R. Belleville Branch	..	..	..
B. & S. I. R.R.	..	..	..
Illinois and St. Louis	..	..	..
Indiana North and South RR.	264	..	..
Evansville & Crawfordsville RR	2,265	..	..
Ohio & Mississippi RR.	..	..	..
Swamee Region.			
Tenn. Coal & R.R. Co.	8,745	..	..
Kanawha Region.			
Chesapeake and Ohio RR.	7.947	..	..
Warrior Region, Ala.			
South and North Alabama RR.	3,424	..	..
Cahaba Region, Ala.			
South and North Alabama RR.	1,390	..	..
S. R. & D. R.R.	1,257	..	..
Chicago B. & Q. R.R	37,634	..	..
B. & M. R.; R.R.	7,371	..	..
Union Pacific R.R. Co.'s mines	..	..	..
" " " other mines	..	..	..
Summit County R.R.	..	..	..
Keokuk & Des Moines R. R.	..	..	..
Denver & Rio Grande	3.104	..	..
Cairo & St. Louis	3,106	..	..

Receipts at Port Richmond, 1,000; shipments, 5,000 tons; and balance on hand 16,500 tons.

Receipts at Greenwich, Philadelphia:

	Bituminous.	Gas Coals.
Receipts	....	101
Shipments	....	....
On hand	....	258

The decrease of shipments of Cumberland coal over the Cumberland Branch, and Cumberland and Pennsylvania Railroads, amounts to 53,763 tons.

The receipts at Buffalo, via. L. S. & M. S. R.R. for the week were 4,609 tons.

The exports of coal from Baltimore for the week were 1,104 tons, and for the year 9,001, as compared with 22,172 tons to the corresponding time in 1874.

	week.	year 1875.	year 1874.
The receipts of coal at Coal Port (Trenton)	..	..	10,870
" " " South Amboy	..	16,807	173.415
Shipments at Coal Port (Trenton)	..	..	8,550
" South Amboy	8,640	78,909	132,937

In the anthracite coal trade there is no particular change to note. The demand is far ahead of the supply, the stock being almost entirely with the Delaware and Hudson Canal Company, the Delaware, Lackawanna and Western Railroad Company, and the Pennsylvania Coal Company. Other stock is held firmly at November prices, for prompt delivery. Orders have been booked so far ahead, that it is difficult to get coal short of three or four weeks. Although the Lehigh and Wilkes-Barre Coal Company, and the Philadelphia Coal and Iron Company, in their opening circulars, say: "Any purchaser desiring to secure a yearly allotment of Lehigh, Wilkes-Barre, Lackawanna or Scranton coal, may include all or either in his application to this Company, with the same effect as if made directly to the Company mining the particular coal," it would appear that in practice this is not quite as intended, for on application to the companies mining coal, it is found that their hands are full of orders from their own customers, and most likely the customers of the companies now idle. The position of the companies working will enable them to secure orders for all the coal the Combination will permit them to produce, and, through favors shown during the scarcity of coal, will give them a decided hold upon the trade which it will be difficult to break if the established prices of the Association are maintained.

The production of anthracite coal for the first three months of this year is nearly 1,200,000 tons short of last year, and should the strike continue during this month, it is safe to say that the decrease will be 500,000 tons more. With this large deficit on the year's business, and stocks with consumers very nearly exhausted, we predict a very active season when it does open. Bituminous coals will, however, tend to lessen this demand, as they are being inquired after by many who have heretofore used anthracite. One prominent gentleman of the anthracite trade concedes a loss, to that trade, in the Eastern markets of about 200,000 tons, while the bituminous companies think they will be able to absorb much more than that amount.

The strikes are without change, excepting that in the Hazleton region there are strong indications of weakness on the part of the miners. Every issue of the daily papers contain dispatches from that region giving an account of some outrage perpetrated by armed bodies of miners. The only conclusions to be drawn are that the miners are dissatisfied with their position, and are trying to bring about by force what they are unable to do by a peaceable strike. Such proceedings as have taken place during the last week destroy sympathy with the miners, and must greatly weaken their case.

We are unable to learn of any additional large contracts for bituminous coal. The inquiries, however, are quite numerous, and sample cargoes are being placed with manufacturers who have heretofore used anthracite. Dealers are anticipating a largely increased trade this year, owing to the troubles in Pennsylvania. Some companies have shown an inclination to force sales, and have given buyers the opinion that lower quotations will be given. Under these circumstances purchases are being delayed as much as possible. We think, however, that we will be able to report some important contracts soon. Prices of Cumberland range from $4@4 25 at Georgetown, and $4 25@4 50 at Baltimore.

Wholesale Prices of Anthracite Coal f.o.b., at the Tide Water Shipping Ports per ton of 2240 lb.

The prices of the Lackawanna, Scranton and Pittston Companies, in the following table, are all that have been fixed as yet for the month of April.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
†Lackawanna and Scranton at Elizabethport & Hoboken	4 60	4 70	4 80	4 95	5 40	4 40
Pittston at Weehawken	4 60	4 60	4 70	4 80	5 30	4 35
Wilkesbarre at Port Johnston	....	....	....	....	....	....
Plymouth, R. A	....	....	....	....	....	....
Susque. Coal Co. at Amboy W.A.	....	....	....	....	....	....
Kingston at Hoboken	....	....	....	....	....	....
Lehigh Coals.						
Old Company at Port Johnston	....	....	....	....	....	....
Old Company's Room Run "	....	....	....	....	....	....
Sugar Loaf at "	....	....	....	....	....	....
Lehigh Coal Exchange "	....	....	....	....	....	....
Honey Brook at Elizabethport	....	....	....	....	....	....
Spring Mt. C. Co. at Hoboken	....	....	....	....	....	....
Beaver Meadow at South Amboy	....	....	....	....	....	....
Schuylkill Coals.						
Schuylkill white ash	....	....	....	....	....	....
Schuylkill red ash	....	....	....	....	....	....
Shamokin white and red ash	....	....	....	....	....	....
N. Franklin	....	....	....	....	....	....
Lorberry	....	....	....	....	....	....
Lykens Valley	....	....	....	....	....	....

Pittston coal is delivered to carts in New York or Brooklyn at 65 cents per ton in addition to the above rates.

Per ton.

Freight from Hoboken and Weehawken to New York..... 45c.
" " Elizabethport & Port Johnston to New York. 45c.
" " South Amboy to New York..... 50c.

Freight from Roudout to New York, by boats or barges of the D. & H. Canal Co., 50c. per ton.

Wholesale Prices of Bituminous Coal.

The following prices are principally fixed for the season, except where otherwise indicated.

Domestic Gas Coals.

Per ton of 2240 lb.	Shipping Ports.	Alongside in New York.
Westmoreland and Penn, at Greenwich, Philadelphia	$5 20	$6 50
" " at S. Amboy	6 00	6 50
Red Bank Cannel Pa., at Phil	8 co	8 50
" " at S. Amboy	8 50	.. ..
" Orrel. " "	6 00	6 50
Youghiogheny, Waverly Co, at Baltimore	5 25	6 50
Despard, West Va., nominal "	5 00	6 62
Murphy Run, W. Va. at Baltimore, nom.	5 00	6 60
Fairmount, W. Va " nominal	5 00	6 60
Newburgh Orrel, Md. " "	5 00	6 60
Cannelton Cannel, W. Va., at Richmond.	9 50	11 00
" Splint, " " "	5 co	6 50
Peytona Cannel, " " "	9 30	11 50
Straitsville, " At Sandusky, O "	3 65	11 60

Foreign Gas Coals.

	Sterling.	Am. cur'cy.
Newcastle, at Newcastle-on-Tyne	....10/6@12/9	6 50@ 7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	47/	18 oc@23 00
" Gas Cannel "	30/	12 00
Scotch Gas Cannel, at Glasgow, nominal.	25/	7 50
	Gold.	
Block House at Cow Bay, N.S.	2 00	5 50
Caledonia, at Port Caledonia	1 75	5 25
Glace Bay, at Glace Bay	1 80	5 50
Lingan, at Lingan Bay	1 75	....
Sydney, International and Reserve mines, at Sydney	2 co	5 50
Pictou, Albion and Vale mines, at Pictou	2 25	5 75

Steam and House Coals.

Broad Top, at the mine, $1.25; at Amboy	4 75@5 00	5 25@5 50
Cumberland, at Georgetown and Alexandria, Va.	4 20@4 40	6 co@6 25
Cumberland at Baltimore	4 25@4 50	6 oo@6 25
Clearfield, " Derby," " Kitanning," "Sterling," and " Eureka," at the mines, $1.25; at Greenwich, Phil	4 60	5 65
James River, carboni-e, at Richmond, Va	6 75	9 00
" bituminous, " nom.	4 00	6 25

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$6 00	$6 20	$5 40
Lackawanna Coal, del'd	7 60	7 85	7 10
*Wilkes-Barre, delivered	7 60	7 85	7 10
Lehigh & Locust Mountain, del'd	8 00	8 00	7 50
Schuylkill Red Ash del'd	8 25		

The cost of delivering Pittston coal ranges from 40 cents to $1 per ton, according to distance from the yard.

* Twenty-five cents less than the above rates are charged to manufacturers.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb				$23 00
Liverpool House Cannel	"	"	"	25 00
American Cannel	"	"	"	16 00
American Orrel	"	"	"	$15 00@16 00
Straitsville Cannel	"	"	"	15 00@16 00
Carbonite	"	"	"	12 00
Cumberland	"	"	"	9 00
Acadia, Pictou, N. S.	"	"	"	14

Philadelphia Coal Trade.

PHILADELPHIA, April 1, 1875.

The amount of Shamokin coal coming down the Reading has considerably decreased since the difficulty between the Railroad Company and some of their train hands on the laterals, and it is reported to be entirely stopped to-day by a general strike in the Shamokin region. The mild weather has caused less pressure on the dealers for domestic purposes; but manufacturers find it very difficult to scrape a supply, and a return of cold weather would create some suffering at several of the towns on the line, and discomfort in many households.

The conduct of some of the men, which, bad as it is, is considerably magnified by some newspaper reporters, does not lead to a settlement of the present difficulty, and shows some weakness. This difficulty will never be settled by false pride, conceit, or obstinacy on either side. There is no doubt that something beyond the mere question of wages is at the bottom of the difficulty. The companies do not want to be controlled by the men, nor the men by the companies, and it is very natural it should be so; but if either wants to control everything, a defeat of one would be no gain to the community—each one must concede.

We can make no trade reports to you until the present state of affairs ceases and shipments are resumed. $2 continues to be the freight to Boston from the Greenwich piers, and 90c. to $1 rates offered to Washington and Richmond.

Baltimore, Md. March 30, 1875.

Reported by our Special Correspondent.

WHOLESALE PRICES PER 2240 lb.

ANTHRACITE.

	By cargoes.	In cars.
Wilkes-Barre, "Lee," or "Diamond,"		
Lump, steamboat	$5 15	$5 60
Broken	5 50	5 73
Egg	5 87	6 15
Stove	6 07	6 35
Pittston and Plymouth.		
Lump and steamboat	....	5 50
Broken	....	5 70
Egg	....	6 05
Stove	....	6 25
"Boston," freeburning white ash	....	5 50
Egg	5 87	5 70
Stove	6 07	6 05
Shamokin, (red or white ash)	....	6 25
Egg	5 81	6 05
Stove	5 92	6 15
Lykens Valley, red ash, egg and stove	6 02	6 55

From wharf or yard, wholesale, 50@75c. additional.
By retail, all kinds and sizes, per 2,240 lb, $7@8 25.

BITUMINOUS.

George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 60	4 75
West Va. Gas Coal f. o. b. at Locust Point	5 50	...
Kanawha Cannel, coarse	13 oc	....
Tyrone	7 25	....
Ritchie Mineral of West Virginia	1 00	....

Boston. March 30, 1875.

Reported by our special correspondent.

CARGO PRICES TO TRADE.

Lingan coal	$ 5 75	Westmoreland, and Penn.	7 25
Caledonia	5 00	Waverly Co. Youghiogh'y	7 25
Pictou	6 15	Cannelton Cannel	11 75
Block House	5 60	Cumberland	6 25@ 6 50
Red Bank Cannel	10 00	Anthracite,	6 50@ 7 25
Glace Bay	5 00	" Retail	7 50@ 8 00
Sydney	7 00		

Buffalo, N. Y. March 30, 1875.

Per ton of 2000 lb.

	Slack.	Nut & Slack.	Nut.	Lump
Connelsville coke				5 80
Sterling cannel				6 00
Red Bank				5 75
Youghiogheny coal for gas				4 75
Briar Hill coal		3 25		4 85
Monterey "		3 25	3 60	3 75
Catfish "		3 25	3 60	3 75
Stoneboro "	2 75		3 75	

Briar Hill coal, and Stirling and Red Bank cannels retail at $7 50; all other coals $1 per ton above wholesale prices.

Anthracite f. o. b. vessel.

Grate	6 70	Stove	7 15
Egg	6 70	Chestnut	6 65

Retail prices delivered and screened, $1 per ton additional.

Chicago, Ill. March 30, 1875.

Specially reported by Messrs. RENO & LITTLE, Coal Merchants

No change in prices of Anthracite

Retail prices per ton of 2000 lb. delivered to buyer.

		BITUMINOUS.	
Lehigh Lump	$10 75	Briar Hill and Erie	7 50@ ....
Lehigh prepared and car load lots	10 25	Walnut Hill (W. Va)	6 50@ ....
Lackawanna, Wilkes-Barre and Pittston,*		Midway (West Va.)	6 50@ ....
		Cannel	8 00@ 9 00
Grate, egg, and chestnut.	10 00	Blossburg	8 00
Stove or range	10 00	Indiana Block	6 00
		Hocking "Brooks"	6 00
		Wilmington and Illinois	5 00

*75 cents off these prices for car load lots to country dealers and manufacturers.

Cincinnati, O. March 30, 1875.

We quote prices for this week as follows:

Per ton of 2000 lb.

	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	8¼c.	——
Pomeroy coal	6c.	——
Cannel coal	16c.	——
Semi Cannel	8c.	——

The following are retail prices delivered:

Youghiogheny	— c.	$3 40
Pomeroy	— c.	2 80
Cannel	— c.	4 50
Kanawha Semi Cannel	— c.	3 40
Anthracite		9 50
Foundry coke	10 c.	——
Soft coke	8 c.	——

Cleveland, O. March 30, 1875.

Reported by our Special Correspondent.

Per ton of 2000 lb. on cars.

Youghiogheny, l'p	$4 40	Columbiana	$3 00
Youghiogheny, nut	3 40	Strip Vein	3 20
Briar Hill, according to quality	$3 85 to 4 00	Mountain Blossburg (blacksmith)	5 50
Massillon	3 65	American Cannel Coal Co.s Cannel	4 50
Hocking Valley	3 25		
Straitsville	3 25		
Anthracite, Lackawanna on cars, Egg			$6 85
" " " "		Stove	7 50
" " " "		Chestnut	7 00
Youghiogheny Coke, " "		here	5 25
Connellsville " " " "			5 50

50 to 75 cents per ton additional for delivery at retail.

Detroit, Mich. March 30, 1875.

Specially reported by Messrs. ROBINSON & KEYS, dealers in all kinds of coal.

There is only a moderate demand for supplies at present, and we may consider the domestic trade as about over for the season. Prices remain as last quoted.

Per ton of 2000 lb.

Lehigh Lump, per ton	$10 50	Blossburg	8 50
Lehigh " prep. sizes.	10 00	Briar Hill	7 50
Wilkes-Barre, Grate and Egg	9 00	Willow Bank	7 00
		Erie	7 50
Wilkes-Barre, Stove and Nut	9 50	Massillon	7 00

Erie, Pa. March 30, 1875

Reported by our Special Correspondent.

The miners in both the Shenango and Mahoning Valleys have been out for some time—those in the Shenango Valley since about the middle of January—and, in consequence, no prices are established for the opening of navigation. It is impossible to say when or how the difficulties will be settled, and prospects for the coming season are not flattering.

Wholesale, per ton of 2,000 lb.

Bituminous f.o.b.

Briar Hill lump	$4 00	Beaver lump	$4 00

Indianapolis, Ind. March 29, 1875.

Specially reported by Messrs. H. McCOY & Co.

Per ton of 2000 lb.

BITUMINOUS.

Wholesale on board cars in city.

Block coal	$2 50@$2 75	Indiana cannel	6 75
Best "	2 40@ 2 50	Hocking Valley	4 25
Block Nut, per car	18 00	Youghiogheny	5 00
Highland " "	18 00	Blossburg (smithing)	6 50
Block slack, per car load	....	Piedmont "	7 75
Peytona, cannel per ton	8 75	Gas coke, ... per bushel.	80

ANTHRACITE (Lackawanna).

Grate	$8 70	Chestnut	8 60
Egg	8 70	Stove	8 85

Retail, per bushel of 70 lb

Block	16c.	Peytona Cannel	32c.
Highland	14	Indiana "	26
Highland Nut, com. use	9	Youghiogheny	24
Block " "	9	Blossburg	26
Slack, steam, "	8	Piedmont	30
Block & Highl'd Mt. steam—			

ANTHRACITE.

per ton.		per ton.	
Grate	$11 00	Stove	11 00
Egg	11 10	Chestnut	11 00

Louisville, Ky. March 30, 1875.

Specially reported by Messrs. BYRNE & SPEED.

The retail price of Pittsburgh coal declined one cent per bushel last week. The price in river has been firm at 9 cents, but on arrival of coming run we expect a slight change. With the opening of pleasant weather the demand is more limited. The following are our retail prices:

Pittsburgh, per load of 1900 lb	$3 50
Pine Hill	3 00
Buckeye Cannel	5 00
Peytona Cannel	5 50
Nut and Slack	2 25
Pine Hill nut	2 25
Kentucky lump, per load	....
" nut, "	....
" Slack "	....
City-made Coke, per bushel	....
Pittsburgh, wholesale, per bush.	....
Kentucky on cars at wholesale, per bush.	....
Anthracite, per ton	$10 to $10 50

Milwaukee, Wis. March 29, 1875.

Specially reported by Messrs. R. P. ELMORE & Co.

Retail prices per ton of 2000 lb.

Lehigh Lump	$10 00	Briar Hill, select	$8 50
Lehigh Prepared	10 50	Blossburg	8 00
Lackawanna	9 50	Pittsburgh	7 50

New Orleans, La. March 27, 1875.

The season for retail business is over with the advent of warm weather; planters begin to make enquiries, and we may soon expect a revival of business in that direction.

Pittsburgh coal, retail, per bbl	75c.
" wholesale	35c.
" to steamboats, per box	60c.
" to manufacturers, per bbl	60c.
" shipments per hhd	$6 00
Anthracite, retail, per ton	$12 50
" wholesale per ton	8 00
Spadra (Arkansas) coal, retail, per bbl	75c.
Mt. Carbon, wholesale, per bbl	45c.
" retail per bbl	65c.
Virginia Cannel, per bbl	90c.
Scotch Cannel, per bbl	1 00

Pittsburgh, Pa. March 30, 1875.

Reported by our Special Correspondent.

The "strike" of the puddlers and the "lockout" of the manufacturers still continue, with no sign of an early termination; consequently the local coal trade remains dull, with no change in prices. The greater number of the miners of the Westmoreland and Penn Gas Coal Companies are still on strike. I am informed that the men now working are to come out on the 1st of April against the proposed reduction. The miners of these companies have issued a circular setting forth their grievances. In comparing the price offered for mining with the price received by the companies for coal, they name $7 50 as prices at New York; whereas you quote at $6 50. The difference would be considered a good profit these times.

Per ton of 2000 lb. and Bushel of 76 lb.

per ton.		per ton	
Youghiogheny coal	$2 00	Pittsburgh retail delivered	
" coke	2 oc@2 25	per bushel	9c@10c
Connellsville coal	2 10	Anth'cite on cars Lehigh	$7 75
" coke	$2 25@2 50	" " Wilkes-Barre	6 75
Pittsburgh coal	1 85		

Twenty-five to fifty cents per ton additional for delivery.

The *Pittsburgh Commercial* of the 30th ult. reports an additional run of coal of 110,000 bushels for Cincinnati, and 978,000 bushels for Louisville. It also gives the following report of the meeting of "The Committee of Councils on City Property":

"The Committee of Councils on City Property met last evening for the purpose of considering bids for the supply of coal for the year.

"Bids for the furnishing of coal for the water works were opened, and the award made to the Castle Shannon Coal Company at 5 39-100 cents per bushel for the lower works and 6 3-10 cents for the upper works.

"For the Forty-fifth street works the award was made to C. H. ARMSTRONG at 6 cents per bushel.

"The matter of furnishing fuel for the Municipal Hall, market houses and police stations was referred to a sub-committee of three, no bids for all having been received."

Toledo, Ohio. March 30, 1875.

Specially reported by Messrs. GOSLINE & BARBOUR.

The following are the quotations on Anthracite and Bituminous coals at Toledo:

Per ton of 2000 lb. on cars.

Hocking Valley	$3 40	Massillon	4 20
Straitsville	3 40	Youghiogheny	5 00
Shawnee	3 40	Blossburg	7 50
" nut	2 90	Cumberland	7 50
Briar Hill	5 50	Connellsville coke	7 00

Anthracite.

Grate, screened	$7 75	Stove, screened,	$8 25
Egg "	7 75	Chestnut "	7 75
Lehigh Lump	9 50		

40 cents to $1 per ton additional for delivery at retail.

Halifax, N. S. March 29, 1875.

Reported by our Special Correspondent.

Prices per ton of 2240 lb. in gold.

Sydney (old mines)	$4 50	Little Glace Bay	3 50
Gowrie	2 50	Blockhouse	4 00
Victoria	3 50	Albion (at Railroad)	4 25

Montreal. March 30, 1875.

Specially reported by Messrs. Robert Adams & Co.

Wholesale per ton of 2,240 lb.

Scotch Steam	$6 25	Cape Breton Steam	$5 75
Pictou "	6 00	Newcastle Smiths	

Anthracite at retail, 2,000 lb., delivered, less 5 per cent.

Egg	$8 50	Chestnut	9 00
Stove	9 50		

Toronto, Ont. March 29, 1875.

Reported by our Special Correspondent.

ANTHRACITE.

	per ton.		per ton.
Broken	$7 65	Chestnut	$7 65
Egg	7 65	Lehigh	9 00
Stove	8 15		

BITUMINOUS.

Blossburgh	7 50	Screenings	5 00
Briar Hill	7 00	Soft Nut	5 50

Freights on Bituminous Coals from the Mines to Tide-Water Shipping Ports.

From the Mines to Cumberland and State Line (say an average of 20 miles) the charge is 3 cents per ton of 2240 lb. per mile.

From State Line to Amboy (346 miles) $3 75 per ton of 2000 lb. On coal shipped beyond this point there is a drawback of 50 cents per net ton.

From Cumberland to Baltimore, (178 miles) $2 31 per ton of 2240 lb., or $2 02 per net ton, and 4 cents per gross ton for use of cars.

From Cumberland to Georgetown, (152 miles) by canal. Canal is open but no shipments are yet made.

From the Mines to Piedmont, (from 4 to 10 miles) 5 cents per ton of 2240 lb per mile on distances less than 5 miles, and 4 cents per ton per mile on distances not over 10 miles.

From Piedmont to Baltimore, (206 miles) $2 69 per ton of 2240 lb., or $2 40 per net ton.

From any point in the Kanawha Valley to the James River wharves below Richmond, (say 350 miles) by C. and O. R. R., including terminal charges, per ton of 2240 lb or Cannel coal, $4 50.

Do., do., for Semi-Cannel or Splint, per ton of 2240 lb., subject to rebate on shipments of 5000 tons or more, $3 65.

From Irwin to W. Phila. (say 332 miles) per P. R. R. Penn. Westmoreland gas coal, per ton of 2000 lb. $4 75

From Osceola to W. Phila (say 248 miles) per T. & C. R. R., per ton bituminous coal of 2000 lb. 3 30

From Fairmount and Clarksburg to Baltimore (say 300 miles) via B. & O. R. R., including loading, per 2000 lb. 4 75

On through coal after deducting drawback

From Richmond, Va., to New York, 392 miles per 2240 lb.. 1 75

" " " *Boston*, about 650 " " 2 75

" " " *Philadelphia*, 292 " " 1 25

From the Mines to Richmond, via James River and Kanawha Canal, 15 miles. 15

Rates of Transportation on Anthracite Coal to Tide Ports.

Lehigh and Wyoming Coals. per ton of 2240 lb.	From Penn Haven.	From Mauch Chunk.	From Hazleton.‡‡	From Upper Lehigh.	From Ashley and Sugar Notch.
To ‡ Newark, N. J. via Central Railroad of New Jersey	2 89	2 73	2 86	3 24	3 45
‡ Mauch Chunk, Pa. via Central Railroad of N. J.	16	..	56	51	72
‡ Phillipsburg, N. J.	1 09	93	1 34	1 44	1 65
‡ Elizabethport, Port Johnston, Hoboken and South Amboy, N. J. shipping and wharfage 35c. a ld.	2 47	2 31	2 80	2 82	3 03
High Bridge, N.J.	2 40	2 20	2 80	2 79	3 09
Somerville and Raritan, N J	2 80	2 63	3 20	3 19	3 49
Elizabeth, Cranford, Westfield and Elizabethport, for consumption.	2 95	2 75	3 35	3 34	3 64
¶ Jersey City, N. J., and New York, via Morris Canal	2 85	2 35	3 17	3 24	3 54
Andover, via Delaware, Lack. and and Western RR	3 30	3 10	3 70	3 69	3 99
§ Trenton, Somerset Junction and Greensburg, via P. RR. Belvidere Division	2 65	2 45	3 05	3 04	3 34
Trenton, for shipment, including shipping and wharfage	2 11	1 95	2 45	2 46	2 76

‡‡ Rates on line coal from Hazleton are 10c. per ton above these figures.

‡ The cost of unloading is to be added to these rates. No charge less than 40c per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 15 per ton.

§ Twenty cents per ton less when five cars at a time to one party. Provided that where the reduction makes the rate $1 a ton, or less, the rate will be $1.

¶ 20 cents per ton additional for transferring coal from boat to boat, and 30 cents per ton for reshipment of same from wharves.

The following rates of freights and tolls on Schuylkill coals are to take effect from and after March 1, 1875:

Schuylkill Coals. per ton of 2240 lb.	From Pine Grove.	From Tamaqua.	From Port Carbon.	From Mount Carbon.	From Schuylkill Haven.
To * *Port Richmond*, for shipment, via P. & R. R. R., Main Line	1 87	1 82	1 75	1 74	1 67
Philadelphia, Reuil yards.	1 97	1 92	1 85	1 84	1 77
Harrisburg, via Lebanon Valley Branch	1 23	1 80	1 73	1 72	1 65
Allentown, via East Pennsylvania Branch	1 52	1 47	1 40	1 39	1 32
Lancaster, and Points on Lancaster Branch, via R. & C. R.R.	1 57	1 52	1 45	1 44	1 37
Dauphin, via Schuylkill and Susquehanna Branch	62	....	1 25 via Aub	1 24 urn.	1 17
Jonestown, via Lebanon and Tremont Branch	86	....	1 69	1 68	1 61
Lebanon, via Lebanon and Tremont Branch	90	....	1 88	1 87	1 80

* On and after March 1, 1875, a charge of fifteen cents per ton will be made for shipping anthracite coal at this point.

From *Tamaqua* to *Catawissa*, via Catawissa and Williamsport Branch Railroad. 94

From *Tamaqua* to *Williamsport*, via Catawissa and Williamsport Branch Railroad. 1 39

THE BRITISH COAL AND IRON TRADES.

March 13, 1875.

The labor questions in the *North of England* look as though they would be peaceably settled. Mr. Rupert Kettle has been hearing the evidence in the case between the miners and masters of the Cleveland mines, where a reduction of 3d. per ton has been asked, and his award will probably be made within a week. The South Durham pitmen who have been asked to submit to a reduction of 20 per cent., have agreed to submit the matter to arbitration. Pig iron is firm in price, at 63/ 6d. for No. 1; 58/@59/ 6d. for No. 2; and forge at 56/@57/. There is not much change in the finished iron trade, it being rather disturbed by the labor troubles. Rails of ordinary sections are quoted at £7. The returns of the Cleveland Ironmasters' Association for February give 156 furnaces built, 32 out and 124 blowing, as compared with 144 built in 1874, 8 out and 136 blowing. The make of iron in February of this year was 154,200 tons as compared with 168,064 tons in 1874, and 173,076 tons in January of this year, or a decrease upon February of last year of 13,864 tons and upon January, 1875, 18,876. Makers' stocks, Jan. 31st, were 93,495 tons, and February 28, 92,744 tons, showing a decrease of 751 tons. There is but little change in the coal trade. There has been a little more enquiry for steam coals. Mild weather has set in in the Elbe and Lower Baltic ports, and a better enquiry is soon expected from that direction. 17/@18/ is still being asked and paid for coke at the ovens.

In the *Barrow-in-Furness* district, the iron trade is scarcely so good as last reported. Prices are a little more easy on the basis of £4 2/ 6d., for No. 1 Bessemer Pig, as compared with £4 5/ last week Iron is not being stocked in great quantities, and the deliveries lately to various parts of the country have been large, but during the past week few orders have been placed. With the Continent there is scarcely anything being done, and there is no prospect of an improvement taking place for some time. Coal is rather firmer, owing to the strike in South Wales and Cumberland, but prices remain the same.

Derbyshire and Yorkshire.—There is a downward tendency to the prices of certain kinds of coal. With the existing dullness of trade and the need of cheap fuel, both masters and men realize the necessity of a reduction in wages. At Sheffield there is a little doing. The engineering and armor plate works are quite busy. Rails, ordinary and Bessemer, are not really active, still, there is more doing than there was two or three weeks ago. A fair amount of business is expected on Russian account, some orders for which have already been given out but only to a moderate extent.

Manchester.—In some cases sales of coal are being pushed at reduced rates, but buyers are holding off, anticipating still lower quotations. Many of the large concerns, however, are well sold up, and are firm in their quotations. Good furnace coal meets with a brisk enquiry, and the best qualities of burgie and slack are not difficult to sell, but the inferior descriptions are dull, and common slack is so complete a drug that concessions are necessary to force sales. For gas coals there is not so much demand, but prices are fairly maintained. The iron trade of the district shows no material change. Middlesborough qualities of pig iron delivered into the district are now quoted at 67/ 6d.@68/ 6d. per ton, and forge qualities at 64/@66/. The market for manufactured iron is slightly easier, and good specifications can be placed at a reduction of 2/ 6d. per ton on list rates.

Wolverhampton.—The demand for manufacturing coal is a degree quieter, and collieries throughout the district are not in active operation. Spring weather returning, the demand for house coals is naturally falling off. Furnace coal is freely offered at 11/ per ton for common, and 13/ per ton for fairly good qualities. The iron trade shows no improvement. Although prices have not really changed, yet there is a tendency to weakness. Common cinder pig is quoted at £3@£3 5/; part-mine, £3 15/@£4; and all-mine pig, £4 15/@£5 5/ per ton. Cold blast is firm at £6 10/. The above prices are not considered remunerative, and it is reported that a number of stacks will be damped down. Common unmarked bars are offering at £8 15/. The leading makers of marked bars are still asking £10 10/.

In *South Wales*, the business of buying and selling iron and coal has been practically suspended, and judging from the course adopted by the masters, and from the attitude of the men, it would appear that it will be a long time before it will be resumed. The principal ironworks are completely stopped, but a few small establishments make feeble efforts to continue in operation. There are being received a few enquiries, but no one anticipates doing a large and profitable trade during the next six months, even if the colliers at once come to terms. These latter, however, are, on the whole, as obstinate as ever, and the inflammatory speeches of their leaders are not likely to make them any more pliable. A good many of the ironworkers—the best men in fact—are migrating to other districts where they can secure work, but the colliers remain to fight the battle. It is calculated that the men are losing £120,000 per week by the strike, and whatever help is afforded by their Association will not go far in relieving their distress.

Scotland.—On March 9th, the business in warrants was very flat, from 73/ 6d. to 73/ 3d. Makers of pigs are at present, in some instances, considerably diminishing their output, as, in view of the restriction of buyers' operations, they are indisposed to throw too much iron into the market. The quantity of pig iron in Connal's stores on Monday afternoon was 28,818 tons, being 111 more than at the same time the previous week. The following quotations of the principal makers' brands do not show much alteration:—Gartsherrie, No. 1, 88/ 6d.; No. 3, 78/; Coltness, 91/ and 77/; Summerlee, 87/ 6d. and 76/; Langloan, 90/ and 77/; Govan, 76/ and 74/; Calder, 90/ and 76/; Shotts, 87/ 6d. and 77/; Carnbroe, 84/ and 76/; Monkland, 76/ and 74/; Clyde, 76/ 6d. and 74/; Glengarnock, 86/ and 77/; Eglinton, 76/ and 74/; Dalmellington, 75/ and 74/; Kinneil, 80/ and 73/; Carron, 77/ 6d. and 75/. The shipments of pig iron from Scotch ports during the week ending the 6th inst., amounted to 8,291 tons, showing a decrease of 373 as compared with those of the corresponding week of 1874. The imports of Middlesborough pigs at Grangemouth for the week were, 3,850 tons, being 1 910 more than in the corresponding week of last year. The malleable trade remains in a very backward condition, and it is stated that, on the score of cheapness, a number of orders have been transferred to the North of England, a circumstance which makes matters worse than they were. In the coal trade there are heavy supplies on all hands, much heavier than can be got rid of, and the prices of all kinds are slightly on the decline. House coal brings from 9/ to 14/ 6d.; steam, 10/ 6d. to 12/ 6d.; splint, 9/ 3d. to 10/; smithy, 16/; and Wishaw main, 8/ 9d. to 9/ 6d. The circular which it was resolved to draw up at the last Delegates' Conference in Glasgow, calling upon the Scotch miners to subscribe towards the relief of the locked out in South Wales, has now been issued in the different mining districts. It points out the necessity and urgency of the case, and will doubtless everywhere evoke sympathy from the miners. But it is very doubtful whether the response to it in money will be such as to render any material assistance. For the most part, the Scotch miners are now making very small wages, in many cases scarcely sufficient to meet their own wants, and however willing they may be to contribute, their inclinations will be much hampered by their means.

We learn by cable, with regret, of the failure of W. T. Henley, Telegraph Engineer, of London, with liabilities of $2,500,000. Mr. Henley has the largest telegragh works in the world, at North Woolwich, and has also a rolling mill in Wales. No statement of assets is given, but from Mr. Henley's high standing and universally recognized integrity, it is presumed his statement will be favorable.

IRON MARKET REVIEW.

Import Duties.

The following are the duties in Gold on Iron:

Flat Iron, not less than 1, nor more than 6 inches wide, nor less than ¾, nor more than 2 inches thick. *Round Iron*, not less than ¾, nor more than 2 inches in diameter, and *Square Iron*, not less than ½, nor more than 2 inches square per pound 1 c. *Flat Round or Square Iron*, of larger or smaller sizes than the above mentioned, per lb 1½c.

Provided, that all iron in slabs, blooms, loops, or other forms, less finished than bars, and more advanced than pig iron, except castings, shall pay the same as iron in bars.

Provided, that none of the above iron shall pay less than 35 per cent.

Railroad Bars—Iron per 100 lb.	70c.
Railroad Bars—Steel per 100 lb.	$1.25
Boiler plates, or other plate iron not less than 3-16 of an inch thick, per lb.	1½c
Scrap castings per ton	$5 40
" *wrought* " "	7 00
Pig iron per ton	7 00
Iron ore 10 per cent. *ad valorem.*	

New York.

April 2, 1875.

American Pig.—There is but little business doing, and sales are mostly in a small way. Prices are nominally $28 for No. 1 Foundry; $26 for No. 2; $24@$26 for Forge. Some makers ask these prices and are anxious to receive bids. The coal troubles, at this writing, are of so serious a nature, that many companies do not care to do business at present prices.

The inquiries for iron are even smaller than we anticipated for this season of the year, although we have never expressed a belief in an active Spring trade. We are accused by the *Bulletin of the Iron and Steel Association* of not knowing that there is a new Tariff Bill in existence. If we had to learn of it by the signs which they prophesied would follow its passage, we should certainly not be aware that it exists; for, instead of an improvement in the iron trade, it has been duller than for years at this season. We will not, however, say that the passage of the bill is the cause of this depression, but it shows that it has had no effect on the trade, as we, in common with all well-informed iron men expected. If the duty had been increased without limit, it would have made but little difference, as the imports, at this port, only amount to 4,310 tons of Scotch pig iron to April 1st, with no importations of rails. Our readers, however, will remember that we noted at the time the reimposition of the 10 per cent. duty. As there is even yet much uncertainty as to the interpretation to be given to several points in the Act, we have preferred to await the receipt of an official interpretation of it, which we are promised next week, before publishing it. It must be quite evident to every thinking man that what the iron trade needs is not the everlasting tariff tinkering which benefits only the lobbyist and some officials. Nor higher duties, which, if they have any influence on our home trade, it is to increase prices and reduce consumption; but it calls for improvements in the manufacture of iron, till we can make it so cheap as to be able to send our surplus out of the country. It must come to this, and the constant call for higher duties, and, consequently, higher prices of iron, is only made in the interest of a comparatively small number of works disadvantageously situated or badly managed. Many of our intelligent iron masters have long seen where the true remedy lies, and are applying that attention to the more skilful and economical management of their works which will enable them to make iron in competition with any part of the world.

Scotch Pig.—We note sales of about 600 tons from ship, on private terms. A part of the above was consigned to parties not regularly in the trade, and is said to have been sold to dealers at a price not covering cost of importation. The demand from consumers continues very light. We quote Coltness at $37, at which price we learn of a sale of 50 tons. Eglinton is quoted at $34@$36.

Rails.—There have been no transactions since the date of our last. We continue to quote American iron at $48@$50 at the mills, and steel at $72.50@$75.

Old Rails.—There is no business doing, and in its absence we quote nominally at $29@$30.

Scrap Iron.—We are reported sales of about 900 tons on private terms, and quote at $35@$36.

Boston. March 27, 1875.

The *Commercial Bulletin* says:

"*Pig* is this week without an item of interest. Several foundrymen from the interior of the State and New Hampshire and Maine have been looking over the market, but having no special orders on hand, and finding a 'high quoting tone,' have bought nothing. The nearest approach to a trade, worthy of mention, is on a lot of Allentown, bought, say, two months ago at the furnace for $27. 100 tons have been landed here in store, and the balance, 200 tons, still at the shipping point, may change hands at a very slight fractional advance on the original cost. Neither party is anxious, and we do not learn at the close that the trade has been closed. One of our Northern visitors reports meeting a lot of New York Bushong at $29, f. o. b., with a freight of $2 25 per ton offered. We find brokers here quoting fancy brands $32@$33, and an occasional extremist asks $35. We do not learn that a ton at any price has been moved off Lewis Wharf or from South Boston. *Bar* is still steadily jobbing at $60 for refined. There is beginning to be quite a scarcity of small sizes, and a disposition to charge a higher price for full lots than for small quantities. Now and then a buyer picks up what he requires at $59, and we have been shown four invoices this week of different purchases at 50 cents a ton less. These we take to be exceptional cases, but still indicating a lack of uniform confidence among dealers. There is absolutely nothing coming forward from Pittsburgh, the reports from that point insisting that our market is less favorable for the small lots they are selling than the West. In boiler plates a fair business is doing. We quote Bay State flange, 6¾c.; do. C. No. 1, 4¾c.; Pennsylvania flange, 5¼c.; do. C. No. 1, 7¾c. *Steel* is holding to its slightly improved business very encouragingly. The heavy frost still in the ground suggests to agricultural tool makers that the farmers will break up their old implements very rapidly in working the land, hence an impetus has been given to plow shares, spades and harrow teeth, rather unusual at this date. Wagon makers have begun to make investments, taking tires at 6¼@7c. We quote American tool, 15@15½c.; American machinery, 9¼@10c.; English tool, 16@17c. *Copper* is extremely dull, both in spots and future, and prices for the week are weak and unchanged, quoting 21¼@21¾c. We quote new sheathing, 28c.; bolts and braziers, 30c.; yellow metal bolts, 28c. *Lead* is very listless and easy; lots of domestic are still offered from New York at 5¾c. Sheet and Pipe, 9c. currency; tin-lined pipe, 16¼c.; bar lead, 9c., less usual trade or 10 per cent. discount. *Spelter* is easy at 6½c. currency. *Tin* is a trifle steadier, foreign advices being rather more favorable, but still not quotably higher. We quote at 21¼c.@22c. gold for Straits; refined English is unchanged at 21c.@21¼c. Plates are active; we quote charcoal I. C., $10@12 50; coke, $8@10; and terne at $8@12 50 per box, currency."

Cincinnati. March 30, 1875.

Specially reported by Messrs. TRABER & AUBERT, commission merchants for the sale of pig iron, blooms, ore, etc.

The market for pig iron is quiet, and prices remain unchanged.

CHARCOAL.		
Hanging Rock, No. 1, Foundry	$28 00@29 00	—4 mos
" No. 2, "	26 00@27 00	—4 mos
" Mill	26 00@	—4 mos
Tennesse No 1, Foundry	27 00@28 00	—4 mos
Tennessee. No. 2 "	26 00@27 00	—4 mos
" Mill	26 00@	—4 mos
Missouri, No. 1, Foundry	30 00@32 00	—4 mos
STONE COAL.		
Ohio No. 1, Foundry	27 00@28 00	—4 mos
" No. 2, "	26 00@27 00	—4 mos
Ohio Mill	25 00@26 00	—4 mos
Missouri, No. 1, Foundry	28 00@29 00	—4 mos
" No. 2, "	26 00@27 00	—4 mos
" Mill	26 00@	—4 mos
CAR-WHEEL.		
Hanging Rock, C. B	45 00@50 00	—4 mos
Tennessee "	40 00@45 00	—4 mos
Missouri "	40 00@45 00	—4 mos
Alabama "	40 00@45 00	—4 mos
BLOOMS.		
Charcoal	75 00@ 90 00	—cash
SCRAP IRON.		
Cast	75@ 90	—cash
Wrought	1 25@ 1 50	—cash

Chicago. March 30, 1875.

Specially reported by Messrs. ROGERS & Co., dealers in Scotch and American pig iron.

Quotations are as follows:

No. 1 Coltness	$46 00@ ....
No. 1 Gartsherrie	45 00@ ....
No. 1 Summerlee	44 00@ ....
No. 1 Glengarnock	42 00@ ....
No. 1 Eglinton	40 00@ ....
Warner's "American Scotch"	41 00@ ....
Massilon No. 1 Foundry	37 00@ ....
No. 1 Grand Tower Mo. ores (Bituminous)	33 00@ ....
No. 2, " " "	30 00@ ....
No. 1 Mill	28 00@ ....
Union "A" 1 (Anthracite)	32 00@ ....
Union "B" 1 (Anthracite)	30 00@ ....
No. 1 Lake Superior (charcoal)	32 00@ ....
No. 2 Lake Superior "	30 00@ ....
No. 3 Lake Superior "	30 00@ ....
No. 4 Lake Superior "	35 00@ ....
Bessemer Steel Rails	85 00@90 00
New Iron Rails	55 00@ ....
Old Rails	28 00@30 00

Cleveland. March 30, 1875.

Specially reported by Messrs. C. E. BINGHAM & Co., dealers in pig iron and iron ore

A few of the following quotations show an advance.

No. 1, Lake Superior Charcoal	33 00@....
No. 2, " "	32 00@....
No. 3, " "	33 00@....
No. 4, " "	34 00@....
Nos. 5 and 6 "	34 50@....
No. 1, Bituminous foundry	28 00@....
No. 2, " "	26 50@....
No. 1. " Gray Forge	25 00@....
American Scotch, No. 1, Cherry Valley	32 00@....
" " No. 2	28 00@....
No. 1, Massillon	31 00@....
B—1, "	29 00@....
No. 2, "	27 00@....

Indianapolis, Ind. March 30, 1875.

Specially reported by NELSON KINGMAN, broker and dealer in pig iron, etc.

Trade very dull at prices named below.

New Rails at mill	$56 00@58 00
Old Rails "	28 00@30 00
Hanging Rock Charcoal Pig No. 1 foundry	29 00@32 00—4 mos
" " " " " 2 "	27 00@30 00—4 mos
" " " Mill	25 00@28 00—4 mos
Car Wheel C. B	45 00@50 00—4 mos
STONE COAL.	
Indiana No. 1 Foundry pig Red Short	30 00@33 00—4 mos
" 2 " " "	28 00@30 00—4 mos
" 1 Forge " "	....@ ....—4 mos
" 2 " " "	....@ ....—4 mos
Ohio No. 1 Foundry pig Cold Short	28 00@30 00—4 mos
" 2 "	26 00@29 00—4 mos
" Mill	25 00@28 00—4 mos
" No. 1 Foundry, Neutral	30 00@34 00—4 mos
" No. 2 " "	28 00@30 00—4 mos
Merchant Bar	2.35c.—3 mos
1st quality C. H. No. 1 Boiler Plates, per lb	5½c.—3 mos
1st " Com. Sheet, for No. 24, W.G. "	4 c.—3 mos
1st " Charcoal Sheet " " "	6 c.—3 mos
Best Bloom Galvanized Sheet, discount 20 per cent	—cash.
2dquality " " " 30 "	—cash.

f. o. b. in Indianapolis.

Louisville. March 30, 1875.

Specially reported by Messrs. GEORGE H. HULL & Co.

The market is quiet, but without indications of any change in price.

The usual time, 4 months, is allowed on the quotations below.

HOT BLAST—CHARCOAL.	
No. 1 foundry, from Hanging Rock ores	$28 00@29 00
No. 2 " " "	26 00@27 00
No. 1, forge, " "	25 00@ ....
No. 1, foundry, " Tennessee "	26 00@27 00
No. 2 " " "	25 00@26 00
No. 1, forge, " "	25 00@ ....
No. 1, foundry, " Alabama "	26 00@28 00
No. 1 " " Iron Mountain "	28 00@30 00
HOT BLAST—STONECOAL.	
No. 1, foundry, from Missouri ores	28 00@29 00
No. 2, " " "	27 00@28 00
No. 1, forge " "	27 00@28 00
COLD BLAST—CHARCOAL.	
Wheel from Hanging Rock ores	40 00@50 00
" " Tennessee "	35 00@38 00
" " Alabama "	38 00@40 00
" " Georgia "	38 00@40 00
" " Missouri "	38 00@40 00
" " Kentucky "	30 00@42 00

Pittsburgh. March 30, 1875.

Specially reported by A. H. CHILDS, Esq., commission merchant, for the sale of pig iron, blooms, ore, etc.

Metal market is quiet, and quotations unchanged.

No. 1 foundry	$26 00@27 00—4 mos
No. 2 foundry	24 50@25 00—4 mos
Gray forge	24 00@ ....—4 mos
White and mottled	22 00@23 00—4 mos

The *Pittsburgh Commercial* of March 27, says:

"The week just closed was decidedly the dullest we have experienced in the iron market for many years. The sales, all told, comprise 245 tons. The demoralization of trade is complete—at least so far as relates to iron. Buyers have evidently absented themselves so long, that there is no demand for manufactured iron. The raw material is not wanted.

The following sales are reported:

BITUMINOUS COAL SMELTED FROM L. S. ORE.	
50 tons white	$20 00— cash.
CHARCOAL.	
45 tons No. 1 foundry, H. R	$30 00@$32 00—4 mos
10 tons No. 1 foundry, H. R	32 00—4 mos
CONNELLSVILLE COKE.	
20 tons No. 2 foundry	$24 50—4 mos
10 tons No. 2 foundry	24 00— cash.
ANTHRACITE.	
10 tons No. 2 foundry	$25 50—4 mos

The *American Manufacturer*, under date of Wednesday, March 31st, says:

"The general position of the pig iron trade, so far at least as our market is concerned, remains substantially as noted in our last review; business is entirely suspended as regards mill iron, and the inquiry for foundry grades is very meagre, being confined mainly to supplying immediate wants. The sales for several weeks past have been exceedingly light, and no improvement in the demand, so far at least as mill irons are concerned, can reasonably be expected as long as the lockout continues. It is not to be expected that the mills will enter the market again until their furnaces have been started up, as there is no inducement for them to stock with the raw article when they have no use for it. When this will take place, it is impossible to foretell; the puddlers may accept the situation within the next week, but it is pretty certain that the manufacturers will not start up until the boilers are satisfied to resume work at $4 50, or prices for finished irons advance sufficiently to enable them to pay $6. The strike may be ended inside of ten days, and it may hold until Fall, and as long as it continues, the operations in the raw article must of necessity continue very meagre. However, notwithstanding the outlook here is by no means encouraging, so far as the producing interest is concerned, producers are hopeful in regard to the future; they appear to be pretty confident that the market has reached the lowest point, and that the next change will be upward; and, as stated in our last review, the feeling appears to be gaining ground in well-informed circles that the estimates in regard to the stock of good mill irons have been considerably exaggerated, also, that as soon as the mills here and those of Eastern Ohio start up again, the market will harden, and an advance will likely be the result."

METALS.

NEW YORK, April 3, 1875.

Gold Coin.—During the week past, gold has ranged from 114¼ to 117, and closed yesterday at 114¼.

Bullion.—Fine silver bar is quoted at $1.25¼@$1.26½; gold, per ounce, and fine gold bar, at par $20 67, gold, per ounce, to ¼ per cent. premium.

Copper.—From 200,000 to 300,000 lb. of copper have changed hands during the latter part of the week, but it went mostly to dealers. The consumptive demand continues light, but the increase in business has given a little more stiffness to prices, which may now be given at 21¼c.@21¾c. Considerable of an advance is looked for, should manufacturers come into the market more largely. There is no cable information being received, so we give latest mail advices which are from Messrs. JAMES & SHAKSPEARE, London, under date of March 19th, and are as follows:—"A large business has been done in furnace material, at 15/ 6d. for ore and 16/ 3d. for regulus, and smelters now control nearly, if not quite, the whole of said stuff known to be on the way from Chili to this country. We note a tolerably fair trade in bars at £80 for good ordinary brands, cash, short arrival, and delivery fixed three months hence; the last terms being on account of parties who believe in lower prices, and hope to cover in with a profit. Picked marks have realized £80 10/ and £81 cash; best brands £81 to £82 cash; the whole of these transactions having taken place on behalf of consumers, who seem to be attracted by the comparatively moderate rates at which such descriptions now offer. Telegrams with the Chili charters for first half of the month are hourly expected; pending arrival of the news, importers and dealers do not care to sell, except at an advance on the quotations lately current. Australian sorts are in rather better demand, but the sales have not yet assumed any importance. Second-hand parcels of tough and select offer below smelters' rates for English; within the last day or two, however, these lots have become rather scarce, and buyers offer very nearly up to manufacturers' prices."

Tin.—We note sales of 150 pigs of Straits at 20¾c., gold, and an outside lot of 5 tons of Refined English on private terms, but under our quotations. Quotations in London and

Singapore remain without change, Straits in the former market being £90, and in the latter $23 50 per picul. In this market the quotations are Straits, 20¾c.@21c., gold; Refined, 20¾c.@20½c.; L. & F. 20c., and Banca, 24c.@25c. By cable we learn that the average of the Dutch Trading Company's sale, which took place on the 31st ultimo, was 52½ florins, equal to £91 in London. Messrs. JAMES & SHAKSPEARE, of London, under date of March 19, say: "English is quiet, but tolerably steady. In Foreign sorts there were considerable fluctuations during the week, prices varying almost daily from 1/ to 2/ per cwt. Straits was the article chiefly dealt in, as there is a large "bear" account open therein, and great efforts are therefore made from time to time to depress prices; the lowest figure accepted for this sort was 84/ cash, but a recovery of about 3/ per cwt. has since taken place. Australian is mostly withheld from the market, and the only transactions recorded were at 87/ 6d@86/ per cwt., which last is now about the selling value."

The demand for tin plates is not active. Prices remain without change. We quote: Charcoal Tins, $9 75@$10, gold; Ternes, $8 75@$9; Coke Tins, $7 75@$8, and Ternes $7 25@$7 75, gold.

Lead.—We note a sale of about 200 tons of Oakland at $5 95, gold, time without interest. With the above exception we learn of no transactions worthy of note. The nominal quotation of Domestic is 6.87½c., currency. Foreigns very quiet at 6½c.@6½c., gold.

Spelter and Zinc—Foreign is inactive at 7c.@7¼c. gold, with small stock. There has been nothing worthy of note done in Domestic, which is more firm than a few weeks ago. The quotations are 6½c.@6½c., currency. The talk of a combination among the Western producers tends to make the market firm. There is but little doing in sheet zinc, which is quoted at 9c.@9¼c., gold.

Antimony.—There is only a little doing at 12¼c.@12¼c., gold.

Quicksilver.—Prices of this article are very much unsettled, but of decidedly a downward tendency. The nominal prices of to-day are: $1.05 per lb. in this market, and 95c. in San Francisco. Our latest foreign advices are by mail, bearing date of London, March 19, which quote at £16 per flask of 75 lb. or a decline of £4 in a week.

FINANCIAL.

New York Stocks.

March 31, 1875.

Both stocks and bonds are firm. Sales of stocks during the week show an increase over those reported for the week previous. The transactions in bonds have been limited; the market for all securities, however, closed firm. We note the following sales at auction to-day: 500 shares Delaware and Hudson Canal Company, 113¾@113¾; 116 shares New Jersey Central Railroad, 112⅝; 4 shares United New Jersey Railroad and Canal Company, 131; $1000 Central Railroad of New Jersey 7 Per Cent. Convertible Bonds, due 1902, 104; and $1000 Central Railroad of New Jersey 7 Per Cent. Consolidated Mortgage Bonds, 107¼.

	Highest.	Lowest.	Closing.
Pennsylvania Coal Co.	—	—	240
Consolidation Coal Co.	48	49	48½
Spring Mt. Coal Co.	—	—	70
American Coal Co.	—	—	48
Maryland Coal Co.	—	—	19
Cumberland Coal and Iron Co.	—	—	—
N. Y. & Nova Scotia Iron Co.	—	—	116
Del., Lack. & West. R.R. Co.	113	111¾	113
New Jersey Central R. R. Co.	113	111¾	112
Delaware and Hudson Canal Co.	113	111¾	112¾
Quicksilver Mining Co. prefrd.	—	—	30
" " " Common.	33	25	26
Mariposa Land & Mining Co.	—	—	—
St. Louis & Iron Mountain R. R.	—	—	15⅛
Wilkes-Barre Coal Co.	—	—	40

Sales for the week, ending the 31st inst., inclusive, were as follows:

	Shares.		Price.		
Del., Lack. and W. RR.	4,668	at from	111¾	to	113
Del. and Hudson Canal	447	"	113¾	"	114¾
New Jersey Central RR.	635	"	111¾	"	113
Quicksilver Mining Co.	2,100	"	25	"	33
Consolidation Coal Co.	700	"	48	"	49
Mariposa Land & Mining Co.	....	"	..	"	....
Maryland Coal Co.	....	"	..	"	....
St. Louis & Iron Mountain R. R.	....	"	..	"	....
Spring Mountain Coal Co	50	"	70	"	....
Quicksilver Mining Co., prefd.	300	"	30	"	....
Pennsylvania Coal Co.	....	"	..	"	....
American Coal Co.	400	"	48	"	....
Total Sales	8,900	shares.			
Sales for the week previous	7,962	"			
Increase	938	"			

The following are the sales of bonds for the same period:

	Amount.		Price.		
Del., Lack. & W. RR. convertible.	$10,000	at from	111¾	to	....
N. J. Central RR. 1st consolidated mortgage bonds	25,000	"	105⅞	"	106¼
St. Louis & Iron Mount'n 1st Mtg bonds,	8,000	"	85⅞	"	87¼
St. Louis & Iron Mountain, 2d Mtg. bonds	....	"	..	"	....
N. J. Central Convertible	3,000	"	108½	"	....
" " 1st Mtg. N.	....	"	..	"	....
Del. & Hudson Canal, 1st Mtg. Reg. bonds, 1891	....	"	..	"	....
Del. & Hudson Canal, 1st Mtg Reg. bonds, 1891	....	"	..	"	....
Del. Lack. & W. R. R., 2d Mtg.	....	"	..	"	....
C. & O. R.R. 1st Mtg. Coupon	....	"	..	"	....
Total Sales	$46,000				

Philadelphia Stocks.

March 30, 1875.

The transactions in stocks at the Philadelphia Stock Market during the week exhibit an increase in sales, with a slight improvement in prices. The dealings in bonds show a falling off. Quotations, however, are firm.

Sales of the following stocks at auction to-day brought the prices annexed:

8 shares Catawissa Railroad, new, Preferred, 38⅛; 100 shares Penn Gas Coal Company, 58; and $8000 Chesapeake and Delaware Canal 6s, 86¼.

On April 1st, semi-annual interest matures on the following: Alleghany Valley Railroad, Eastern Extension, 7s; Huntingdon and Broad-Top Railroad First Mortgage 7s; Little Schuylkill Railroad First Mortgage 7s; Reading Coal and Iron Company 7s, of 1892; on the Morris Canal First and Second Mortgage 6s; and Boat Loan, and on the Lehigh Navigation Company's 6s, (quarterly.)

Semi-annual dividends of the following companies are payable during April: The Westmoreland Coal Company, the Cambria Iron Company, the Nescopec Coal Company. Quarterly dividends, each at the rate of 7 per cent. per annum, have been announced by the following companies: Lehigh Valley Railroad, April 15th; and the Delaware, Lackawanna and Western Railroad, April 20th.

Quotations are as follows:

	Lowest.	Highest.	Closing.
Reading R. R. Co.	56⅞	57⅛	57
Lehigh Valley R. R. Co.	63¾	64	64
Little Schuylkill R. R.	—	—	49
Catawissa R.R.	—	—	—
" " Preferred	—	—	43
" " New Preferred	38¾	39	38¾
Huntingdon and B. T. R.R.	8⅛	8¼	8⅛
" " " " Preferred.	15¾	16¼	16
Minehill R.R.	—	—	53
Lehigh Coal and Navigation Canal	50¼	51⅜	50⅞
Morris Canal	—	—	50½
" Preferred	—	—	128½
Pennsylvania Canal	—	—	—
Schuylkill Navigation Canal	—	—	7⅝
" " Preferred	14¾	15	14¾
Susquehanna Canal	—	—	7
Westmoreland Coal Co.	—	—	86
Buck Mountain Coal Co.	—	—	40
Cambria Iron Co.	—	—	18¼
Locust Mountain Coal Co.	—	—	—
Emaus Iron Co.	—	—	45

The following are the aggregate sales of stocks for the week ending March 30:

	Shares.		Price.		
Reading Railroad	1,429	at from	56⅞	to	57⅜
Lehigh Valley RR. Co.	466	"	63¾	"	64
Little Schuylkill RR.	18	"	49	"	—
Catawissa RR.	....	"	—	"	—
" " preferred	37	"	43	"	—
" " new preferred	317	"	38¾	"	39
Huntington & B. T. R. R.	200	"	8¼	"	8⅜
Huntington and B. T. RR., p'f'd	772	"	15¾	"	16¼
Minehill RR.	67	"	53	"	—
Lehigh Coal and Navigation Canal	22,528	"	50¾	"	51¾
Schuylkill Navigation Canal	....	"	—	"	—
" " " p'f'd	82	"	14¾	"	15
Morris Canal, preferred	....	"	—	"	—
Susquehanna Coal Co.	....	"	—	"	—
Cambria Iron Co.	....	"	—	"	—
Pennsylvania Canal	....	"	—	"	—
Susquehanna Canal	32	"	6¾	"	7
Total sales	25,948	shares.			
Sales for the week previous	19,054	"			
Increase	6,894	"			

Sales of the various bonds for the period under review have been as follows:

	Amount.		Price.		
Reading RR. 6s, 44, 80	$6,000	at	101¾	to	....
Catawissa RR., new 7s	....	"	..	"	....
H. and B. T. RR., 2d mortgage, 7s	2,000	"	102	"	....
Lehigh convt. gold loan	....	"	..	"	....
Pa. and N. Y. Canal, 7s	....	"	..	"	....
Schuyl. Nav. 6s, '82	1,100	"	80	"	....
L. V. RR. 6s, coup.	5,000	"	103	"	....
H. and B. T. 1st Con. bonds	....	"	..	"	....
R. C. and I. Co. irregular mort. bonds, Hili Tract	....	"	..	"	....
Lehigh Nav. 6s, 1884	7,100	"	100	"	....
Reading RR. debenture bonds	....	"	..	"	....
" " R. G. M. 7s, coup.	4,000	"	107	"	....
" " new convertible 7s	4,500	"	106	"	....
Reading C. and I. Co. debenture bonds,	1,000	"	84½	"	....
Reading C. and I. Co. mort. bonds, Tamaqua Tract	....	"	..	"	....
Reading C. and I. Co. mort. bonds, St. Clair Tract	....	"	..	"	....
R. C. & I. Co., Wetherill tract	....	"	..	"	....
" " " Locust Mountain Summit Improvement tract	....	"	..	"	....
R. C. & I. Co. Helfenstim tract	....	"	..	"	....
Lehigh Valley RR. 6s, registered	1,000	"	103¾	"	....
" " " 7s	....	"	..	"	....
Lehigh Coal & Nav. Co. 6s, gold loan	9,000	"	101⅜	"	....
" " " " 6s, RR. loan	2,000	"	102½	"	....
" " " " 6s, 1884	....	"	..	"	....
Schuylkill Nav. 6s, '95	4,000	"	79¼	"	....
" " 7 per cent. boat loan	....	"	..	"	....
" " 6s, '72	1,598	"	94½	"	95
" " Div'd scrip	37.50	"	93	"	....
R. C. & I. Co., Gleutworth tract	....	"	..	"	....
Chesapeake & Delaware Canal, 6s	....	"	..	"	....
Susquehanna Canal, 6s	....	"	..	"	....
Pennsylvania Canal, 6s	....	"	..	"	....
Shamokin Valley & Pottsville R.R., 7s	....	"	..	"	....
Allegheny Valley 7 3-10s	....	"	..	"	....
" " " Eastern Exte'n.	....	"	..	"	....
Del. Div. Canal, 6s	....	"	..	"	....
Total Sales	$48,300				

Gold and Silver Stocks.

SAN FRANCISCO, March 31, 1875.

With but few exceptions, the San Francisco list continues to advance. Kentuck and Alpha have attained the highest point reached during the month. Overman and Chollar are respectively $12 and $10 in advance of our last quotations. Ophir is the only stock which exhibits a decline worthy of note, the report placing it at $8 per share below our quotations of the 24th inst. A recent number of the *Commercial Herald* remarks: "The flow of bullion from the mines thus far for the year has been very large, and the year's product promises a very large increase over that of 1874.

Quotations, March 31, 1875:

Gould & Curry	19	Raymond & Ely	43
Savage	138	Eureka G. V.	8
Chollar Potosi	70	Best & Belcher	52
Ophir	101	Kentuck	18
Hale and Norcross	50	Meadow Valley	7
Crown Point	35	Alpha	24
Yellow Jacket	96	Sierra Nevada	13
Belcher	37	Union Consolidated	9
Imperial	9	Mexican	28
Consolidated Virginia	450	Caledonia	18
California	64	Silver Hill	11
Overman	64		

Copper Stocks.

BOSTON, April 1, 1875.

The Central Mining Company's shares have advanced one point, as compared with our last. The remaining portion of the copper list is weaker. Transactions during the week have been very limited. Yesterday's sales were confined to small transfers of Calumet and Hecla, Quincy, and Allouez, all within the limits of our quotations. We note recent sales of Duncan Silver at 50c. per share, and the Franklin Mining Company at $9½ per share. A recent contemporary remarks: "The yield of the Pewabic Mining Company for the last five months has amounted to 294,607 lb." The stock of this Company recently sold for $7¾ per share.

Quotations are as follows:

Allouez	8	Pewabic	—
Calumet and Hecla Co.	146	Phœnix	13
Copper Falls	8¾	Quincy	35¼
Central	24	Ridge	6
Franklin	—	Rockland	1

Gas Stocks.

The following quotations of various Gas Stocks represent prices at which actual sales of the same have been made during the week:

New York Gas Light Company	144½
Peoples' Gas Light Company, Albany, N. Y.	42½
Cambridge, Mass., Gas Company	135½
San Francisco Gas Light Company	99
Hartford, Conn., Gas Company, par $25	40
Portland, Me., Gas Company, par $50	70
Boston, Mass., Gas Light Company	735

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The ENGINEERING AND MINING JOURNAL, which is the Organ of the Institute, and contains its proceedings, transactions and notices of meetings, will be sent to each Member and Associate on the payment of his annual dues. Back numbers cannot, as a rule, be sent.

II. Dues (ten dollars per annum) are payable on election and at the annual (May) meeting. Members and associates elected at the February meeting pay ten dollars only to May of the following year. Remittances should be made, as far as possible, by P. O. Order, payable to the Secretary.

III. Blank proposals for membership can be had on application to the Secretary.

IV. The second volume of Transactions has been mailed to all home members and associates not in arrears. Any member who failed to receive his copy will please notify the Secretary promptly. The Institute is not responsible for the loss of the volume in those cases where members have changed their residences and have omitted to inform the Secretary. Volumes I. and II. will be sent, post-paid, to non-members, at five dollars each.

V. Members are earnestly requested to inform the Secretary promptly of any change of address.

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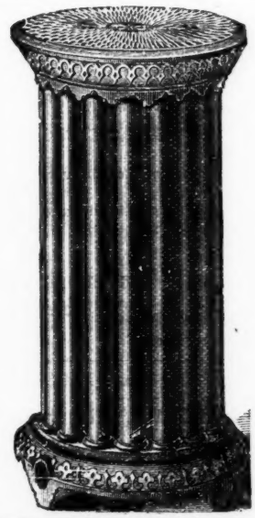

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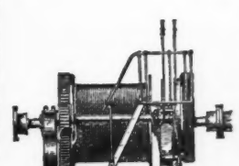

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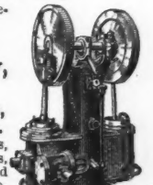

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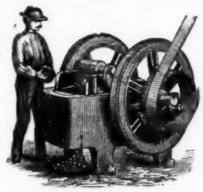

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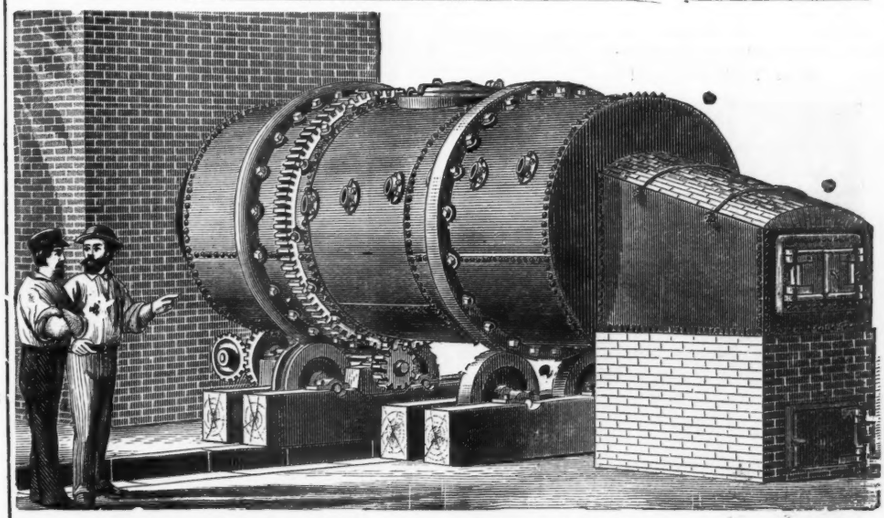

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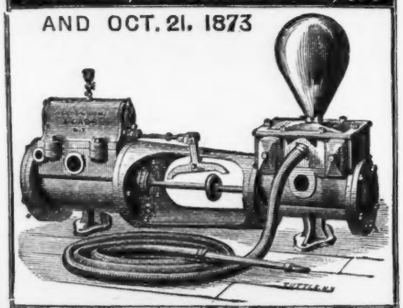

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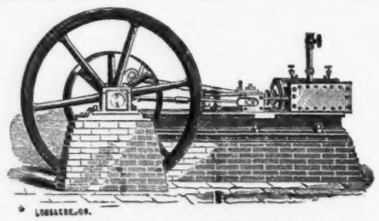

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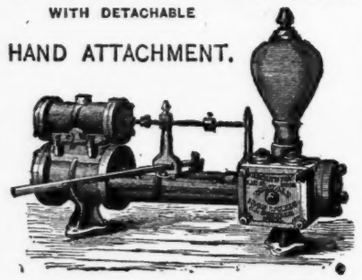

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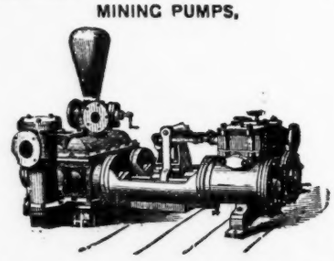

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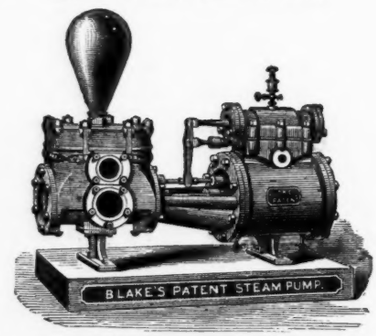

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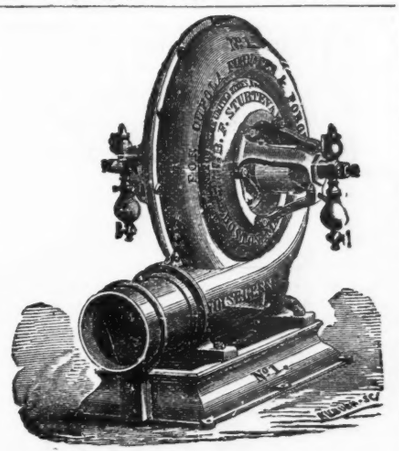

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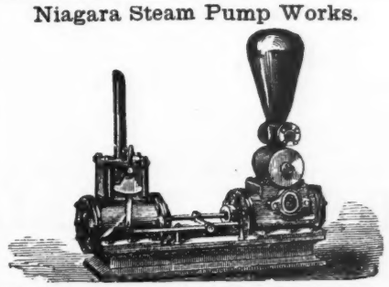

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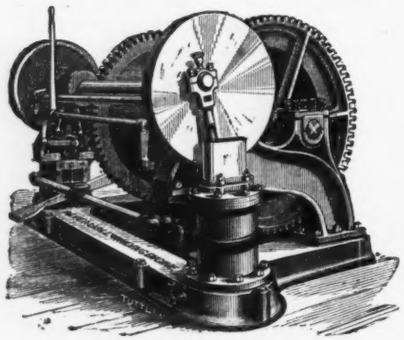

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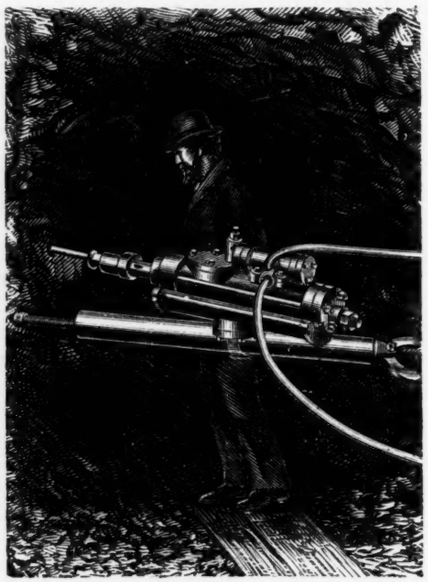

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